Province of British Columbia
Ministry of Energy, Mines and
Petroleum Resources
Hon. Anne Edwards, Minister

MINERAL RESOURCES DIVISION
Geological Survey Branch

LIMESTONE AND DOLOMITE RESOURCES IN BRITISH COLUMBIA

By Peter Fischl

This is a contribution to the Canada/British Columbia Mineral Development Agreement 1985-1990.

OPEN FILE 1992-18

This report may not conform to normal British Columbia Geological Survey Branch editorial standards for publications.

Canadian Cataloguing in Publication Data
Fischl, Peter
Limestone & dolomite resources in British Columbia

(Open file, ISSN 0835-3530 ; 1992-18)

Includes bibliographical references: p.
ISBN 0-7718-9202-0

1. Limestone - British Columbia 2. Dolomite - British Columbia. 3. Geology, Economic - British Columbia. I. British Columbia. Geological Survey Branch. II. Title. III. Series: Open file (British Columbia. Geological Survey Branch) ; 1992-18.

TN967.F57 1992 553.5'16'09711 C92-092198-1

VICTORIA
BRITISH COLUMBIA
CANADA

AUGUST 1992

SUMMARY

Limestone and dolomite are found in abundance throughout most of British Columbia. Carbonate deposits ranging in age from Proterozoic to Jurassic can be found in all five of the tectonic belts that make up the Canadian Cordillera (Insular, Coast, Intermontane, Omineca and Foreland). The more dolomitic deposits are largely restricted to the Omineca and Foreland belts.

Purer limestone units, with generally minor contamination by chert and dolomite, are confined to extensive platformal and shelf deposits in the Upper Triassic of the Insular Belt, the Permo-Carboniferous of the Intermontane Belt and the Mississippian and Upper Devonian of the Foreland Belt. Limestones associated with island arc sequences such as the Buttle Lake Group of the Insular Belt and the Nicola and Takla groups of the Intermontane Belt are commonly siliceous, argillaceous and limited in size. The Coast and Omineca belts contain limestones commonly contaminated with dolomite and various metamorphic silicates.

Extensive bedded dolomite deposits are confined to northeastern and southeastern British Columbia within Proterozoic and Paleozoic miogeosynclinal rocks of the Omineca and Foreland belts. Silt is a frequent contaminant in such deposits and chert is prevalent in some units. Smaller deposits of secondary origin occur sporadically in roof pendants of the Coast Belt, and adjacent to intrusions and faults in the Insular and Intermontane belts. Some of these deposits are contained within magnesian limestone units with sporadic dolomitization.

Limestone production in British Columbia is dominated by three major quarries on northern Texada Island, where some 4.2 million tonnes of limestone are currently mined each year. Approximately 400 000 tonnes of limestone are produced annually from six operations in the interior of the province and from one quarry on northern Vancouver Island. Two Texada Island quarries produce limestone for commercial suppliers of cement and lime, while one quarry east of Kamloops supplies limestone for cement manufacturing. A second interior quarry, at Marble Canyon (Pavilion Lake), produces limestone for lime manufacturing. The two Texada Island quarries and two quarries in the interior supply chemical-grade limestone to pulp mills. White limestone is currently quarried at three sites on the coast and at one location in the interior for fillers, extenders and pigments. A minor amount of limestone is used for riprap, railway ballast, soil conditioners and a variety of other crushed and ground products for use in glass manufacturing, as food additives, fluxes and other applications.

White dolomite is currently produced at a rate of 40 000 tonnes annually from two operations in southeastern British Columbia for agricultural, decorative and pigment applications. Several other dolomite deposits have been assessed in the past as a source of magnesium metal, but there has been no production for this use.

TABLE OF CONTENTS

Page

SUMMARY iii

INTRODUCTION 1
Selected Bibliography 2

COMPOSITION AND CLASSIFICATION OF CARBONATE ROCKS 3

FORMATION AND DISTRIBUTION OF CARBONATE ROCKS IN BRITISH COLUMBIA 5

PRODUCTION AND CONSUMPTION OF LIMESTONE IN BRITISH COLUMBIA 11

DEPOSIT DESCRIPTIONS 15

INSULAR BELT 17
Mount Mark Formation 17
Quatsino Formation 22
Texada Island 23
Northern Vancouver Island 30
Central and Southern Vancouver Island 37
Quadra Island 41
Parsons Bay Formation 42
Kunga Group (Sadler Formation) 43
Bonanza Group 46
Wark and Colquitz Gneissic Complex 47
West Coast Complex 50

COAST BELT 53
Southern Coast Belt 53
Northern Coast Belt 58

INTERMONTANE BELT 63
Chilliwack Group 63
Cache Creek Group 65
Cache Creek Complex 67
Stuart Lake Belt 74
Atlin Terrane 77
Harper Ranch Group 79
Mount Monashee - Okanagan Lake Segment 80
Okanagan Lake - Jamieson Range Segment 81
Unnamed Permian Limestones 84
Terrace Area 84
Babine Lake Area 86
Permian Limestone - Stikine River Area . . . 87
Hozameen Group 87
Fergusson Group (Bridge River Group) 88
Nicola Group 89
Shoemaker Formation 94

Page

Takla Group 95

OMINECA BELT 97
Ingenika Group 97
Reeves Limestone (Laib Formation) 99
Badshot Formation 101
Tshinakin Limestone (Eagle Bay Assemblage) 104
Mural Formation 106
Lower Cambrian Limestone - McLeod Lake/Crooked River Area 108
Nelway Formation 108
Lardeau Group 109
Sandpile Group 111
Pend d'Oreille Sequence 111
Anarchist Group 112
Milford Group 114
Slide Mountain Group 115
Knob Hill Group 116
Mount Roberts Formation 117
Sicamous Formation 118
Brooklyn Formation 119
Metamorphic Complexes - Omineca Belt . . . 122

FORELAND BELT 125
Jubilee Formation 125
Beaverfoot Formation 127
Nonda Formation 128
Palliser Formation 128
Rundle Group 130
Southern Foreland Belt 132
Northern Foreland Belt 133

APPENDICES

1. MINFILE Listings 135
2. Listing of Limestone and Dolomite Occurrences in this Report by Map Number 147

TABLES

1. Constituents Commonly Listed in a Proximate Analysis 3
2. Conversion Factors 3
3. Limestone and Dolomite Production in British Columbia for 1986 and 1987 11
4. Limestone and Dolomite Consumption in British Columbia for 1986 and 1987 12
5. Analyses of samples of Mount Mark limestone . . 18

6. Analyses of Quatsino (Marble Bay) limestone, Texada Island 23
7. Analyses of Quatsino limestone, northern Vancouver Island 31
8. Analyses of Quatsino limestone, central and southern Vancouver Island and Quadra Island . 37
9. Analyses of Parsons Bay limestone 43
10. Analyses of Kunga limestone 45
11. Analyses of Bonanza limestone from Kashutl Inlet 46
12. Analyses of limestones in Wark and Colquitz gneisses and West Coast Complex 48
13. Analyses of limestones in the southern Coast Belt 54
14. Analyses of limestones in the north Coast Belt 59
15. Analyses of Chilliwack limestones 63
16. Analyses of Marble Canyon limestones 69
17. Analyses of bulk samples from Robertson Creek deposit 72
18. Analyses of Cache Creek limestones in the Stuart Lake belt 74
19. Analyses of Harper Ranch limestones 81
20. Analyses of unnamed Permian limestones 85
21. Analyses of Hozameen and Fergusson limestones 88
22. Analyses of Nicola, Shoemaker and Takla limestones 91
23. Analyses of Ingenika limestones 98
24. Analyses of Reeves limestones 100
25. Analyses of Badshot limestones 102
26. Analyses of Tshinakin and Mural limestones ... 105
27. Analyses of Lardeau limestones 110
28. Analyses of Sandpile and Pend d'Oreille limestones 112
29. Analyses of Anarchist and Milford limestones .. 113
30. Analyses of Knob Hill and Mount Roberts limestones 116
31. Analyses of Sicamous limestones 118
32. Analyses of Brooklyn limestones 120
33. Analyses of limestones in Monashee and Grand Forks gneisses 123
34. Analyses of Jubilee and Beaverfoot dolomites .. 126
35. Analyses of Nonda and Palliser limestones ... 129
36. Analyses of Rundle Group limestones 131

MAPS *(in pocket)*

1. Limestone and Dolomite Occurrences of British Columbia
2. Geology and Limestone Occurrences of Northern Texada Island (92F/10, 15)

FIGURES

1. Tectonic Belts of British Columbia 5
2. Major Limestone Units of the Insular Belt 6
3. Major Limestone Units of the Intermontane Belt . 6
4. Major Carbonate-bearing Units of the Omineca Belt 7
5. Simplified Mississippian - Upper Devonian Stratigraphy of the Rocky Mountain Belt 7
6. Major Dolomite Units of the Foreland Belt 8
7. Geology of the Horne Lake Area, Vancouver Island 18
8. Distribution of Kunga Group Lower Limestone Member (Sadler Formation) 44
9. Geology of Marble Range, Marble Canyon - Hat Creek Area 66
10. Geology of Marble Range, West of Clinton ... 68
11. Geology of the Harper Ranch Area, Northeast of Kamloops 78

INTRODUCTION

Limestone and dolomite deposits of varying size and quality are found throughout British Columbia. Some of the more accessible ones are currently being exploited for the manufacture of cement, lime, agricultural soil conditioner and a variety of crushed and ground products. Other carbonate deposits will be explored and possibly developed in the near future to satisfy increasing demand for limestone by the pulp and paper industry and for limestone and dolomite as fillers and extenders. Consumption by the mining industry will also become increasingly important in the very near future for the treatment of a variety of mine effluents. This Open File report has been prepared to meet industry demands for up-to-date information on limestone and dolomite in the province. Detailed descriptions are given for a number of carbonate occurrences (excluding magnesite, marl, travertine, tufa) throughout British Columbia, based on a compilation of previously published and unpublished literature dealing with limestone and dolomite in the province. The report is exhaustive in respect to available, up-to-date geological data. It can be expected, however, that with further exploration, many more exploitable limestone and dolomite bodies will be discovered.

This compilation relies extensively on several previous province-wide compilations. The first, Canada Department of Mines Report 452, *Report on the Building and Ornamental Stones of Canada*, Volume 5, by W.A. Parks (1917) was part of a national compilation of dimension stone (marble, granite, *etc.*). Lithological descriptions and chemical analyses are given for a number limestone (marble) deposits. The second, Canada Department of Mines Report 811, Limestones of Canada, Part 5, 1944 by M.F. Goudge (1944), was a more detailed compilation based on field examinations of numerous occurrences throughout British Columbia. J.W. McCammon and Z.D. Hora of the Ministry of Energy, Mines and Petroleum Resources have since prepared two unpublished lists of occurrences: *Limestone Occurrences in British Columbia*, in 1973 and *Dolomite Occurrences in British Columbia*, in 1980. These are essentially a complete listing of occurrences by area, following the National Topographic System. The two compilations are largely based on literature of regional nature (*e.g.*, Geological Survey of Canada maps and memoirs) and some unpublished information. Very brief descriptions are occasionally given for some of the occurrences listed.

In addition to the province-wide compilations, a few publications provide information on carbonates in particular areas. British Columbia Ministry of Energy, Mines and Petroleum Resources Bulletin 23, *Calcareous Deposits of Georgia Strait Area*, by W.H. Mathews (1947), reviews carbonate deposits on Texada Island, southern Vancouver Island and on the Lower Mainland. A decade later this bulletin was revised and reprinted as Bulletin 40, *Calcareous Deposits of Southwestern British Columbia*, by W.H. Mathews and J.W. McCammon (1957). The B.C. Minister of Mines Annual Reports for 1954 to 1968 and annual editions of *Geology, Exploration and Mining in British Columbia* for 1969 to 1973 contain reports on field examinations of limestone and dolomite occurrences by several authors. Additional descriptions by Z.D. Hora can be found in the *Geological Fieldwork* series published annually since 1975. The Geological Survey of Canada occasionally sampled carbonates in the course of regional mapping programs up to the 1950s; the results are published in the Memoir series.

Most of the literature on limestone and dolomite in British Columbia is a product of government surveys. Traditionally, both limestone and dolomite were excluded from the definition of "mineral" under the Mineral and Land Acts. Until recently tenure over limestone and dolomite deposits had always belonged to the owner of surface rights to the land. The administration of tenure on Crown lands followed the regulations of the Land Act. This was, however, changed in 1988 with proclamation of the new Mineral Tenure Act. Under this act both commodities are defined as "minerals". As with other mineral occurrences, limestone and dolomite deposits must now be "staked" in accordance with the Mineral Tenure Act. Staked mineral claims are maintained by carrying out exploration work and submitting the results in the form of assessment reports to the Ministry of Energy, Mines and Petroleum Resources. In the past, before the enactment of the Mineral Tenure Act, only a handful of limestone deposits were staked and the amount of information previously made public by industry in the form of assessment reports was very limited.

In addition to assessment reports, a number of private reports have been voluntarily submitted to the Industrial Mineral Subsection over the years. With the cooperation of a number of companies and individuals, this collection was greatly expanded during the preparation of this report .

The author wishes to express his sincere thanks to the numerous industry representatives for assisting with advice and providing information and copies of private

reports, which would otherwise be inaccessible to the Ministry. The author wishes to also thank Danny Hora for initiating this project and reviewing this manuscript, and Dr. N.W.D. Massey of the Ministry and Dr. W.R. Danner of the University of British Columbia for providing information on limestones of the Insular and Intermontane tectonic belts. Drafting by S. Dumais is also much appreciated. John Newell is also acknowledged for providing a thorough edit of this manuscript. This project was funded by the Canada/British Columbia Mineral Development Agreement, 1985-1990.

SELECTED BIBLIOGRAPHY

Bowen, O.E. (1973): Limestone and Dolomite Resources of California; *California Division of Mines and Geology*, Bulletin 194, 60 pages.

Carr, D.C. and Rooney, L.F.(1983): Limestone and Dolomite; *in* Industrial Minerals and Rocks, 5th Edition, S.J. Lefond, Editor, American Institute of Mining, Metallurgical and Petroleum Engineers, Inc., pages 833-868.

Danner, W.R. (1966): Limestone Resources of Western Washington; *Washington Division of Mines and Geology*, Bulletin 52, 474 pages.

Danner, W.R. (1976): Limestone Resources of Southwestern British Columbia; *in* Proceedings of the 11th Forum on Geology of Industrial Minerals, *Montana Bureau of Mines and Geology*, Special Publication 74, pages 171-186.

Goudge, M.F. (1944): Limestones of Canada, their Occurrence and Characteristics; *Canada Department of Mines and Resources, Mines and Geology Branch*, Report 811, Part 5, 233 pages.

Mathews, W.H. (1947): Calcareous Deposits of the Georgia Strait Area; *B.C. Ministry of Energy, Mines and Petroleum Resources*, Bulletin 23, 113 pages.

Mathews, W.H. and McCammon, J.W. (1957): Calcareous Deposits of Southwestern British Columbia; *B.C. Ministry of Energy, Mines and Petroleum Resources*, Bulletin 40, 105 pages.

Holter, M.E. (1976): Limestone Resources of Alberta; *Alberta Research Council*, Economic Geology Report 4, 91 pages.

McCammon, J.W. (1973): Limestone Occurrences in British Columbia; *B.C. Ministry of Energy, Mines and Petroleum Resources*, unpublished report, 37 pages.

McCammon, J.W. and Hora, Z.D. (1980): Dolomite Occurrences in British Columbia; *B.C. Ministry of Energy, Mines and Petroleum Resources*, unpublished report, 4 pages.

O'Driscoll, M. (1988): Dolomite, More than Crushed Stone; *Industrial Minerals Magazine*, Sept. 1988, pages 37-63.

Parks, W.A. (1917): Report on the Building and Ornamental Stones of Canada; *Canada Department of Mines*, Mines Branch, Report 452, Volume 5, 236 pages.

COMPOSITION AND CLASSIFICATION OF CARBONATE ROCKS

Carbonate rocks are rarely monominerallic but are generally comprised of various carbonate minerals with minor to trace amounts of siliceous and carbonaceous (organic) matter. Limestone consists dominantly of calcite ($CaCO_3$), the most common carbonate mineral. By definition, it contains at least 50 per cent by weight $CaCO_3$ (American Geological Institute; Glossary of Geology, 2nd Edition, 1980, R.L. Bates and J.A. Jackson, Editors). Aragonite is a form of calcite that differs only in its crystal structure and is usually found in more recent deposits (*e.g.* shells, coral reefs, precipitates from hydrothermal springs, *etc.*). Dolomite [$CaMg(CO_3)_2$] is commonly found in minor quantities in limestone, as grains, lenses and thin beds. Occasionally, however, carbonate deposits are comprised almost entirely of dolomite. A few other carbonate minerals, such as siderite ($FeCO_3$), ankerite [$Ca_2MgFe(CO_3)_4$] and magnesite ($MgCO_3$) usually occur in trace amounts.

Silicates are a common but minor constituent of most limestones and dolomites. Quartz (SiO_2) and various clay minerals (aluminosilicates) are the most common silicate minerals found in carbonate rocks. Quartz occurs as individual sand or silt-sized grains or as veins. Chert, a very fine grained form of quartz, tends to form nodules, lenses and thin beds. Metamorphosed carbonates may contain a variety of metamorphic silicates such as garnet, idocrase, tremolite and wollastonite.

Because of their variable mineralogy, carbonate deposits must be sampled and tested for an array of constituents in order to determine their suitability for particular industrial applications. Sample results are presented as proximate analyses, where most of the constituents are listed as oxides as shown in Table 1. Results are always given in weight per cent.

TABLE 1
CONSTITUENTS COMMONLY LISTED IN A PROXIMATE ANALYSIS

USUAL FORM	COMMON ALTERNATIVE
CaO	$CaCO_3$
MgO	$MgCO_3$
Al_2O_3	R_2O_3
Fe_2O_3	
Mn_3O	
Na_2O	
K_2O	
TiO_2	
S	SO_3, SO_4
CO	Ignition Loss
H_2O	(L.O.I.)

Calcium contents are usually given in terms of CaO (lime) and, less commonly, as $CaCO_3$. Conversion factors between the two are given in Table 2. In this report all analytical results are reported as CaO, the more common usage. This analysis is critical in assessing the purity of limestones; pure limestone contains 100 per cent $CaCO_3$ or 56.03 per cent CaO.

TABLE 2
CONVERSION FACTORS

TO CONVERT		MULTIPLY BY
FROM	TO	
$CaCO_3$	CaO	0.5603
CaO	$CaCO_3$	1.7848
$MgCO_3$	MgO	0.4781
MgO	$MgCO_3$	2.0917

Magnesium contents are commonly reported as MgO (magnesia) or $MgCO_3$ (magnesium carbonate). Conversion factors between the two are also listed in Table 2. The purity of dolomite can be assessed from either analysis; pure dolomite contains 21.86 per cent MgO or 45.72 per cent $MgCO_3$.

Silica (SiO_2) and alumina (Al_2O_3) are useful in determining the amount of contamination by silicate minerals. In older publications insolubles and "R_2O_3" are reported in place of SiO_2 and Al_2O_3. Insolubles refer to the residue remaining after carbonate minerals are dissolved using acetic, nitric, sulphuric or hydrochloric acid. Insoluble residues are comprised mostly of silica with minor amounts of other metal oxides and carbonaceous matter. Analyses reported as R_2O_3 essentially represents the sum of Al_2O_3 and Fe_2O_3, with the addition of minor amounts TiO_2, P_2O_5, Be_2O_3, Cr_2O_3 and ZrO_2. If any of these oxides are reported separately they are excluded from R_2O_3. For example, where Fe_2O_3 is reported separately, as is commonly the case, R_2O_3 is essentially equivalent to Al_2O_3.

Iron is reported as Fe_2O_3 (ferric oxide) in most proximate analyses of limestone and dolomite. It occurs in various forms in carbonate rocks: siderite ($FeCO_3$) and ankerite ($Ca_2MgFe(CO_3)_4$) are two carbonate minerals containing iron; iron sulphides, most commonly pyrite (FeS_2), may also be present; silicates such as garnet,

epidote mica and chlorite also contribute to the total iron content.

Alkalies, Na_2O (soda) and K_2O (potash) are usually present in trace amounts and generally indicate the presence of such silicate minerals as mica and feldspar.

Sulphur contents are usually reported as elemental sulphur (S), although the sulphur usually occurs in the form of iron sulphides; sulphur also tends to be associated with the carbonaceous matter found in carbonates.

Ignition loss (L.O.I.) refers to the amount of volatile matter driven off when carbonate rocks are heated to high temperatures. Such volatiles include carbon dioxide, water and organic materials. Most of the volatile matter is comprised of carbon dioxide. In most analyses ignition loss is given in place of separate analyses for carbon dioxide and water. Water is not included with ignition loss if it is reported separately. Ignition loss is typically a few per cent greater than the carbon dioxide content. Pure limestone and dolomite contain 43.97 per cent and 47.73 per cent carbon dioxide respectively.

Brightness (whiteness) is commonly tested for crushed and ground limestone or dolomite used in fillers, extenders and granular products. Dry brightness is determined by measuring the reflectance of a pellet of ground limestone or dolomite relative to a standard that is assigned a brightness of 100. The American Society for Testing and Materials specifies a surface coated with magnesium oxide as one standard (A.S.T.M. Standard E 97-55); barium sulphate is also commonly used. Brightness is reported in per cent. The colour of light used in measuring the brightness is usually also reported. "G.E. brightness" is a term commonly used in reporting brightness readings in North America and refers to brightness measured by a reflectometer that has been calibrated against the master reflectometer of the Massachusetts Institute of Technology. This particular instrument is a product of General Electric, hence the term "G.E. brightness."

A number of classification schemes have been applied to carbonate rocks based on such criteria as texture, origin and mineralogy. For industrial applications a classification system relying on chemical composition is most useful. A commonly used scheme based on carbonate compositions is outlined below (modified from Mathews and McCammon, 1957, page 7):

Ultra high calcium limestone: at least 97 per cent calcium carbonate (54.3% CaO).
High-calcium limestone: at least 95 per cent calcium carbonate (53.2% CaO). Up to 2 per cent magnesium carbonate (0.96% MgO).
Calcium limestone: contains predominantly calcium carbonate but cannot be classified as high-calcium limestone; contains up to 10 per cent magnesium carbonate (4.79% MgO).
Magnesian (magnesium) limestone: 10 to 40 per cent magnesium carbonate (19.15% MgO).
Dolomitic limestone: greater than 40 per cent to less than 45.72 per cent magnesium carbonate (21.86% MgO). The term "dolomitic limestone" is used quite loosely in most geological literature, especially in regional studies. In such cases magnesium limestone may also be referred to as dolomitic limestone. The term "dolostone" would be a more useful alternative to the term "dolomitic limestone" in this classification system, since it is used to describe carbonate rocks comprised almost entirely of the mineral dolomite.

Other chemical-based definitions (Bowen, 1973, p. 23) are:
Limy dolomite: 20.9 to 37.7 per cent magnesium carbonate (10-18% MgO)
High-magnesium dolomite: at least 37.7 per cent magnesium carbonate (18% MgO)
High-purity dolomite: at least 41.8 per cent magnesium carbonate (20% MgO).

FORMATION AND DISTRIBUTION OF CARBONATES IN BRITISH COLUMBIA

Limestone is a sedimentary rock formed by the biochemical precipitation of calcite or aragonite by various organisms such as corals, bivalves and algae. It occurs less commonly as a chemical precipitate unrelated to organic activity (*e.g.* oolites).

Limestones are found in all five tectonic belts of the Cordillera (Figure 1). Their general characteristics are in part a function of the tectonic belt in which they occur.

The Insular and Intermontane belts are comprised dominantly of volcanic and sedimentary rocks deposited

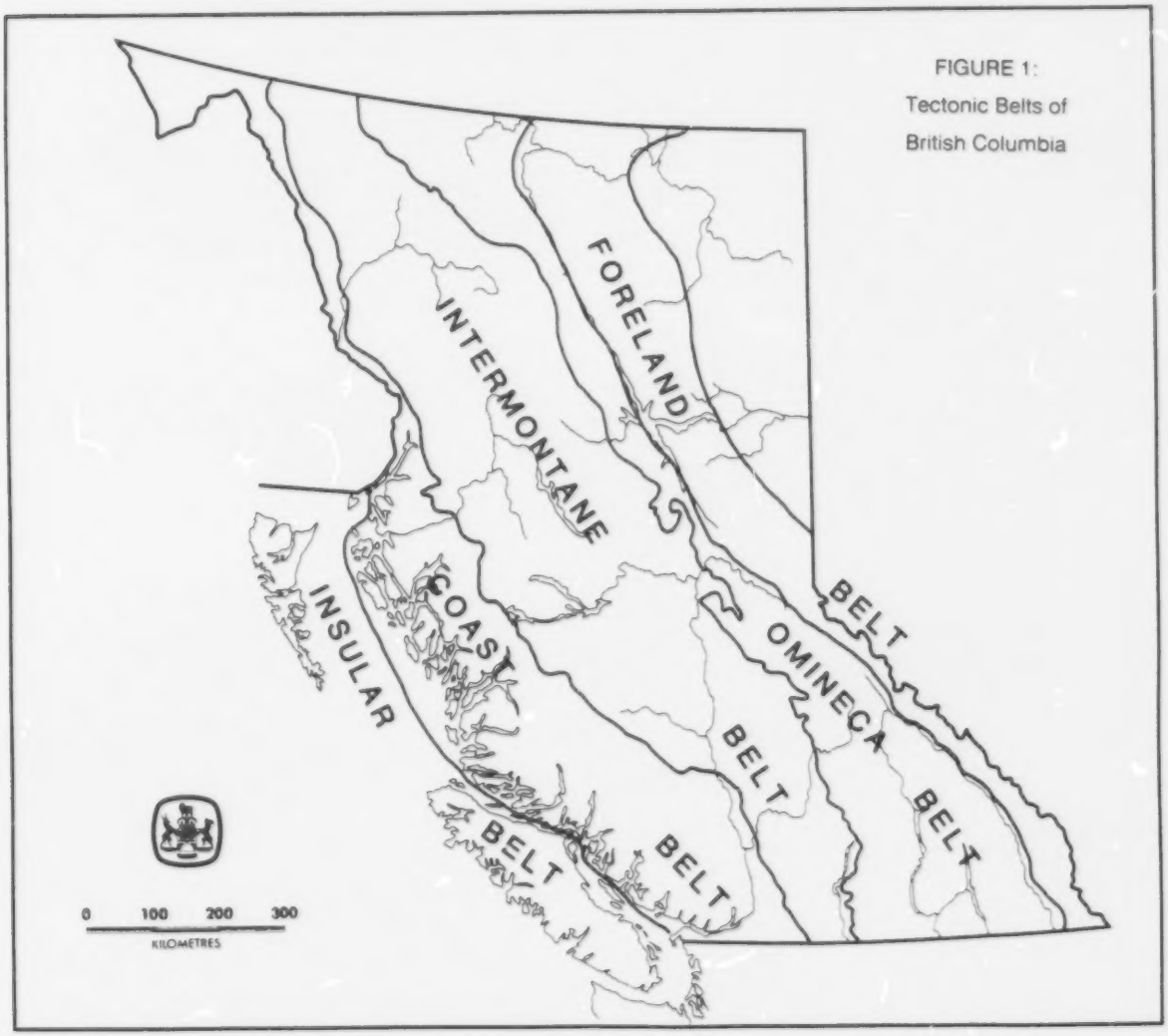

Figure 1. Tectonic belts of British Columbia.

AGE	FORMATION			
	SOUTHERN INSULAR BELT		NORTHERN INSULAR BELT	
JURASSIC				
TRIASSIC	Vancouver Group	Parsons Bay Fm Quatsino Fm.	Kunga Group	Peril Fm. Sadler Fm.
PERMIAN				
	Mount Mark Formation			
PENNSYLVANIAN				

Figure 2. Major limestone units of the Insular Belt.

AGE	FORMATION						
	SOUTHERN INTERMONTANE BELT			CENTRAL INTERMONTANE BELT		NORTHERN INTERMONTANE BELT	
JURASSIC							
TRIASSIC	Nicola Goup					Sinwa Formation	
PERMIAN	Chilliwack Group	Harper Ranch Group	Marble Canyon Fm.	Cache Creek Group (Stuart Lake belt)	Unnamed Terrace limestone	Horsefeed Formation	Teslin Formation
PENNSYLVANIAN	Chilliwack Group						
MISSISSIPPIAN							

Figure 3. Major limestone units of the Intermontane Belt.
NOTE: Only ages of limestone bearing intervals shown.

AGE	FORMATION				
	SOUTHERN OMINECA BELT			CENTRAL OMINECA BELT	NORTHERN OMINECA BELT
JURASSIC		Sicamous Formation			
TRIASSIC	Brooklyn Fm.				
PERMIAN		Mount Roberts Formation			
PENNSYLVANIAN	Attwood Group				
MISSISSIPPIAN		Milford Group			
DEVONIAN		Lardeau Group		Sandpile Group	
SILURIAN					
ORDOVICIAN					
CAMBRIAN	Nelway Fm.				
	Reeves	Tshinakin	Badshot	Mural Fm. / McLeod Lake	
PROTEROZOIC				Cunningham Formation	Espee Formation (Ingenika Group)

Figure 4. Major carbonate-bearing uinits of the Omineca Belt.

AGE	FORMATION			
	SOUTHEASTERN B.C.		NORTHEASTERN B.C.	
MISSISSIPPIAN	**Rundle Group**	Etherington Fm		
		Mt. Head Fm		
		Livingstone Formation	**Rundle Group**	Turner Valley
				Shunda Fm
				Pekisko Fm
	Banff Formation		Banff Formation	
	Exshaw Formation		Exshaw Formation	
UPPER DEVONIAN	**Palliser Formation**		**Palliser Formation**	
	Alexo Formation		Besa River Formation	

Figure 5. Simplified Mississippian-Upper Devonian Stratigraphy of the Rocky Mountain Belt.
Note: Important limestone units show in bold.

AGE	FORMATION	
	SOUTHEASTERN B.C	NORTHEASTERN B.C.
DEVONIAN	Alexo Formation	Stone Formation
SILURIAN		Muncho-McConnell Formation
		Nonda Formation
ORDOVICIAN	Beaverfoot Formation	
CAMBRIAN	Jubilee Formation	

Figure 6. Major dolomite units of the Foreland Belt.

on oceanic plates remote from ancestral North America. Movement of the earth's crustal plates resulted in these "exotic" terranes colliding with the ancestral continent during the late Mesozoic and early Cenozoic. These oceanic terranes contain significant carbonate units ranging in age from Mississippian to Late Triassic. Figures 2 and 3 show the major limestone units of the Insular and Intermontane belts. Massive limestones of extreme purity are confined to platformal carbonates in the Upper Triassic of the Insular Belt and Mississippian to Permian of the Intermontane Belt. Limestones deposited in island arc sequences of the Insular Belt (*e.g.* Buttle Lake Group) and the Intermontane Belt (*e.g.* Nicola and Takla groups) tend to be more siliceous, argillaceous and limited in extent.

The Coast Belt (Coast plutonic complex) is a product of intense plutonism caused by the accretion of the terranes of the Insular Belt (Wrangellia, Alexander) to North America in the Late Cretaceous and Early Tertiary. Carbonates of limited extent and varying composition occur here as metamorphosed roof pendants within granitic rocks and represent remnants of units of the Insular Belt and possibly the Intermontane Belt.

The Omineca Belt is comprised of plutonic and metamorphic rocks resulting from the accretion of various terranes of the Intermontane Belt (*e.g.* Stikinia, Quesnellia, Cache Creek) during the Late Jurassic and Early Cretaceous. The belt contains Precambrian to Triassic limestones (Figure 4) deposited in eugeosynclinal and miogeosynclinal settings, usually as shallow-water shelf sediments.

The Foreland Belt hosts similar unmetamorphosed miogeosynclinal limestones ranging from Cambrian to Triassic in age. They tend to occur in northwest-trending belts of considerable extent (Map 1) as a result of folding and faulting and are typically bedded and occasionally quite pure. The purer deposits are contained in units of Mississippian and Upper Devonian age (Figure 5).

Dolomite may be of sedimentary or hydrothermal origin. Sedimentary dolomite may occur as a chemical precipitate (*i.e.* primary) or more likely as a replacement in limestones that have experienced an influx of magnesium rich brines shortly after their deposition (*i.e.* diagenetic). Dolomite replacement may occur throughout an entire deposit or be confined to particular beds within it. Significant sedimentary deposits are largely restricted to Paleozoic and Proterozoic miogeosynclinal strata of the Omineca and Rocky Mountain belts. Figure 6 shows the important dolomite units of the Foreland Belt. Silt-sized particles of quartz are a common contaminant of such deposits. Chert is also frequently present in some units.

Hydrothermal dolomite is formed when fluids generated through plutonic activity or regional metamorphism are circulated through limestone units. Carbonates dolomitized in such a manor are commonly brecciated

because of the decrease in volume (13 per cent) that occurs when limestone (calcite) is replaced by dolomite. Numerous examples of this form of dolomitization occur in the Coast Belt and to a lesser extent in the Insular and Omineca belts. Occasionally, the hydrothermal fluids are channelled along faults or fractures. The Pinchi fault is such an example; limestones of the Cache Creek Group lying adjacent to the fault on the east margin of the Intermontane Belt are sporadically dolomitized. The hydrothermal dolomitization of limestone is usually incomplete, hence dolomitized limestones may grade from dolomite through to magnesian limestone.

PRODUCTION AND CONSUMPTION OF LIMESTONE IN BRITISH COLUMBIA

Limestone and dolomite are currently produced from a few locations throughout the province for a variety of uses. Most of the limestone production currently originates from Texada Island on the coast, while most of the dolomite production comes from Crawford Creek, east of Kootenay Lake. Tables 3 and 4 outline the production and consumption of both commodities in British Columbia for 1986 and 1987.

Most of the limestone consumed in cement manufacturing in British Columbia is quarried on northern Texada Island by Ashgrove Cement West Inc. (Blubber Bay quarry) and Holnam West Materials Ltd. (formerly Ideal Cement Company Ltd.). The two companies supply the cement plants of Tilbury Cement Ltd. in Delta, and Lafarge Canada Inc. in Richmond B.C. Both also supply their own cement plants in Washington and Oregon. Lafarge Canada, which operated a quarry on Texada Island up to 1986, continues to quarry limestone 18 kilometres east of Kamloops to supply its adjacent cement plant. Generally high- calcium limestone is required for cement manufacturing, although some calcium limestone is also used. The higher silica and alumina contents found in some limestones may be useful for manufacturing cement but excessive amounts of alkalies cannot be tolerated. Total alkalies (Na20 + 0.658 x K20) should be below 0.6 per cent. Magnesia content commonly cannot exceed 3 per cent.

Lime manufacturing is another important use of limestone in the province. Texada Lime Ltd. produces lime (CaO) and quicklime [Ca(OH)2] at a plant in Langley. The company is supplied with limestone from Texada Island. Continental Lime Ltd. (formerly Steel Brothers Canada Ltd.) operates a lime plant and an adjacent quarry in Marble Canyon west of Cache Creek. Limestone used for lime manufacture must be at least high-calcium in composition, with less than 2.5 per cent MgO.

The pulp and paper industry is also a significant consumer of limestone in British Columbia. It was initially consumed by pulp mills using the acid sulphite process of manufacturing pulp from wood chips. About half the mills now use the sulphate (kraft) process, while the remaining

TABLE 3
LIMESTONE AND DOLOMITE PRODUCTION IN BRITISH COLUMBIA FOR 1986 AND 1987 (tonnes x 1000)

LIMESTONE

COMPANY	LOCATION	1986	1987
Holnam West Materials Ltd.	Texada Island	1149.8	1907.5
Ashgrove Cement West Inc.	"	1046.5	1046.3
Imperial Limestone Ltd.	"	*173.8	*140.9
Lafarge Canada Inc.	"	341.4	0
* * *	Kamloops	126.9	155.3
Steel Brothers Canada Ltd.	Marble Canyon	*146.1	*194.6
Kokanee Contracting Ltd.	Dahl Lake	25.4	30.0
(Northrock Industries)			
Quesnel Readi-mix Cement Co.	Purden Lake	10.0	0
International Marble & Stone Co. Ltd.	Lost Cr.	*7.1	*6.6
* * *	Benson Lake	*9.9	*13.2
	Totals: 3036.8	3494.4	

DOLOMITE

International Marble & Stone Co.	Crawford Creek	*27.7	*31.9
Mighty White Dolomite Ltd.	Rock Creek	8.0	8.0
	Totals:	35.7	39.9

Source: Mineral Policy Branch of the B.C. Ministry of Energy, Mines & Petroleum Resources

* *Indicates tonnes mined instead of tonnes shipped.*

TABLE 4
LIMESTONE AND DOLOMITE CONSUMPTION IN BRITISH COLUMBIA FOR 1986 AND 1987 (tonnes x 1000)

USE	1986	1987
Cement manufacture		
Domestic	1282.8	1051.1
Foreign	468.1	724.1
Lime Manufacture		
Domestic	290.7	388.1
Foreign	395.9	584.5
Pulp and paper	129.4	165.1
Agriculture	19.1	27.0
Fillers (whiting)	31.7	31.3
Stucco dash	14.4	18.1
Crushed rock (aggregate, railroad ballast, fill, riprap, road metal, etc.)	283.1	328.5
Other		
Domestic	8.9	14.7
Foreign	149.7	142.5
Totals:	3073.7	3475.1

Source: Mineral Policy Branch of the B.C. Ministry of Energy, Mines & Petroleum Resources

Note: Dolomite used for whiting and agriculture

half use mechanical processes. The sulphate process has gained wide acceptance over the years, because it produces a stronger pulp more economically. Pulp mills using this method require lime (CaO) to recover the caustic soda (NaOH) used in the sulphate process. Most mills calcine their own limestone on site to produce the required lime. The various mechanical processes presently used by half of the mills do not require lime or limestone. Kraft and mechanical processing are expected to maintain their relative importance in the local pulp industry in the near future. Kraft mills situated on or near the coast are currently supplied by Texada Island. Limestone from Texada Island has been shipped to mills along the Pacific coast from Alaska to northern California. In the past, a few quarries operating on the coastal mainland fulfilled part of this demand. Several quarries in the interior currently supply mills located at McKenzie, Prince George and Quesnel. Limestone or "pulp rock" consumed by the pulp and paper industry is at least high-calcium in composition, with less than 3.0 per cent MgO.

Agricultural limestone (or "agri-lime") is generally produced as a byproduct by the major quarries. It is required to neutralize acidic conditions found in some soils. A number of attempts were made to quarry limestone in northeastern British Columbia and the Prince George area between 1983 and 1986 specifically to supply agricultural markets in Alberta. During this period the Alberta government offered a transportation subsidy to cover costs of transportation to markets in Alberta. Limestone used for "agri-lime" can range from high- calcium to dolomitic in composition.

A small amount of carbonate rock quarried in the province is crushed and ground for a variety of uses such as fillers and extenders in paints and plastics, as chips and granules for architectural and decorative purposes, and in the manufacture of glass. International Marble and Stone Company Ltd., Mighty White Dolomite Ltd., Imperial Limestone Ltd. and Holnam West Materials Ltd. are currently producing limestone and dolomite for such purposes. International Marble and Stone operates a quarry at Benson Lake on Vancouver Island and an underground mine at Lost Creek, southeast of Salmo in the Kootenays. The company also mines dolomite at Crawford Creek near Kootenay Lake. Mighty White Dolomite operates a dolomite quarry southeast of Rock Creek in the Boundary District east of Osoyoos. Imperial Limestone and Holnam West Materials each produce white limestone from two quarries on northern Texada Island, largely for export to Washington State. Limestone and dolomite for use in most fillers and extenders must have a brightness in excess of 85 per cent (ideally 95 to 96 per cent dry brightness in blue light), low iron contents and

no silicates. Glass manufacturers require limestone with no more than 0.10 per cent Fe_2O_3. Excessive iron causes a greenish discoloration in glass.

The consumption of limestone and dolomite is expected to increase in a number of areas in the near future. The province's mining industry will be relying more on limestone to control acid rock drainage and to neutralize waste cyanide used in the treatment of gold ores. The pulp and paper industry is expected to consume increasing amounts, especially with the recent construction of new mills in northern Alberta, some of which will require limestone. In addition to pulp manufacturing, limestone is also used as a coater and filler in paper, where alkali processes are employed. Alkali processing of pulp for paper manufacturing in Europe is quite common. North American paper producers have been slow to switch to alkali processes but is scope for development in this market for white limestone. Limestone is currently used as a filler and coater in fine paper but production is comparatively small in British Columbia and the Pacific Northwest, because of the limited market for the product. The increasing use of precipitated calcium carbonate (PCC) in paper manufacturing may also limit this market for white limestone. Dolomite may eventually be required to control sulphur emissions from the coal-fired electrical generating plants that are being considered to partly fulfill the steadily rising demand for electricity in the province.

DEPOSIT DESCRIPTIONS

The following sections describe the various carbonate deposits and their host formations. Generally, only deposits that have been previously described in detail are included. Other, less well known deposits are described in MINFILE and are listed in Appendix 1. Formations are described only if they host deposits that have been described in detail and this report cannot be used as a comprehensive guide to the carbonate stratigraphy of British Columbia, although most of the more important carbonate units are included.

Geological formations and groups are organized by tectonic belt (*i.e.* Insular, Coast, Intermontane, Omineca and Foreland, Figure 1), the exception being the inclusion of the Chilliwack, Fergusson and Hozameen groups in the Intermontane Belt instead of the Coast Belt. This is because these units lie east of the main granitic mass of the Coast crystalline complex. Some formations occur in both the Foreland and Omineca belts. In such cases, a formation is included with the belt which contains most of the described deposits for that particular formation. The host formations and groups are presented in order of decreasing age within the individual tectonic belts. Where formations are of similar age, the formation lying farther to the west or south is described first. Units of unknown age are described last. The stratigraphic setting, distribution, thickness and general lithology of the carbonate units are outlined in regional summaries for each unit.

Regional references to publications of the Geological Survey of Canada and the British Columbia Ministry of Energy, Mines and Petroleum Resources are given after each formation summary.

The individual deposit descriptions are organized by host formation or group and follow the regional summaries of the host units. The more important deposits are described first. Size, quality and the amount of information available are factors considered in determining the relative importance of the deposits. Where formations contain numerous deposits over widespread areas, the deposits may be subdivided geographically or geologically into smaller groups before being ranked in order of importance.

Each deposit is assigned a number in MINFILE, the Geological Survey Branch's computerized mineral inventory database. Information from MINFILE can be obtained by the general public on printouts or computer diskettes. Each carbonate occurrence described in this report is also assigned a map number in order of appearance in the text. The location plots of each occurrence shown on Map 1 are labelled with their corresponding map number. The map numbers of carbonate deposits comprised mostly of limestone are preceded by the letter L, while those of dolomitic deposits are preceded by the letter D.

The name, MINFILE number and map number is included in each deposit description. Names are usually derived from nearby physiographic features or population centres. Sometimes the name of a company that has been involved in developing or mining a deposit is used. A second name is commonly given in parentheses.

Each deposit is located by NTS map sheet, latitude and longitude. The NTS number refers to the 1:50 000 scale map sheets of the National Topographic System. Latitudes and longitudes are determined primarily from either quarry or sample locations (drill holes, chip samples, grab samples). If a quarry or sample location cannot be used the coordinates are given as the centre of the largest carbonate outcrop.

A selected bibliography is given after each deposit description, using the same format as the regional references.

INSULAR BELT

MOUNT MARK FORMATION (BUTTLE LAKE LIMESTONE)

Mount Mark Formation is the name proposed for the thick section of limestone of the Buttle Lake Group (formerly of the Sicker Group) exposed on the south face of Mount Mark, northeast of Port Alberni on Vancouver Island. This Late Pennsylvanian to Early Permian carbonate unit was previously mapped as the Buttle Lake Formation (Muller, 1980). In the Cowichan uplift, the Buttle Lake Formation has been renamed the Mount Mark Formation (Massey, 1988). Even though redefinitions of the stratigraphic nomenclature of this unit and other associated upper Paleozoic rocks on Vancouver Island have not yet been published, for consistency, other outcrops of Permo-Pennsylvanian limestone previously mapped as Buttle Lake Formation are referred to in this report as the Mount Mark Formation. It should be noted that Dr. S. Juras of Westmin Resources Ltd. has proposed the name "Azure Lake Formation" for this unit in the Buttle Lake uplift (N.W.D. Massey, personal communication, 1989).

The Mount Mark Formation is usually conformably underlain by argillite, siltstone, chert and greywacke of the Cameron River Formation (Muller's "sediment-sill" unit), but sometimes rests unconformably on volcanics of the McLaughlin Ridge and Nitinat formations. Basaltic flows of the Upper Triassic Karmutsen Formation unconformably overly the limestone.

Significant outcrops of the Mount Mark Formation occur in the Buttle Lake uplift, the Cowichan uplift, northwest of Tofino on the west coast of Vancouver Island, and on the south end of Texada Island. In the Buttle Lake area the limestone outcrops along the margins of the uplift to the west, south and southeast of Buttle Lake as a series of northerly trending belts segmented by north to northwest-striking, steeply dipping faults. The unit varies up to 150 metres thick in this area. In the Cowichan uplift the limestone is exposed principally in a series of discontinuous belts that sweep southeastward along the west flank of the uplift from Horne Lake along the west side of the Nitinat River and just west and south of the community of Lake Cowichan. Smaller, less extensive northerly trending belts outcrop north and south of Cameron Lake, west of the Cameron River and on the Nanaimo River. Exposed thicknesses vary up to 360 metres

The Mount Mark Formation generally consists of fine to coarse grained, well-bedded, crinoidal limestone with minor interbedded chert and argillite. Nodules and irregular masses of chert frequently contaminate the limestone and dolomitic beds are common.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Jeffrey, W.G. (1964): Buttle Lake Area (Part of 92F); unpublished Preliminary Map.

Massey, N.W.D. and Friday, S.J. (1987): Geology of the Cowichan Lake Area, Vancouver Island (92C/16); *in* Geological Fieldwork 1986, Paper 1987-1, pages 223-229.

Massey, N.W.D. (1988): Geology of the Chemainus River - Duncan Area, Vancouver Island, (92C/16; 92B/13); *in* Geological Fieldwork 1987, Paper 1988-1, pages 81-91.

Massey, N.W.D. (1989): Geology of the Alberni - Nanaimo Lakes Area, Vancouver Island (92F/1W, 92F/2E and part of 92F/7E); *in* Geological Fieldwork 1988, Paper 1989-1, pages 61-74.

Massey, N.W.D., Friday, S.T., Tercier, P.E. and Rublee, V.J. (1987): Geology of the Cowichan Lake Area (92C/16); Open File 1987-2, 9 Sheets.

Massey, N.W.D., Friday, S.T., Tercier, P.E. and Potter, T.E. (1987): Geology of the Chemainus River and Duncan Area (92C/16, 92B/13); Open File 1988-8, 10 sheets.

Massey, N.W.D., Riddell, J. and Dumais, S. (1989): Geology of the Port Alberni - Nanaimo Lakes Area (92F/1W, 2 and part of 7); Open File 1989-6, 9 sheets.

Geological Survey of Canada:

Clapp, C.H. and Cooke, H.C. (1917): Sooke and Duncan Map-areas, Vancouver Island; Memoir 96 and accompanying Map 42A.

Muller, J.E. (1969): Alberni, British Columbia; Map 17-1968.

Muller, J.E. (1980): The Paleozoic Sicker Group of Vancouver Island, British Columbia; Paper 79-30, 23 pages.

Muller, J.E. (1982): Geology of Nitinat Lake Map Area, British Columbia; Open File 821.

Muller, J.E. (1985): Geology, Victoria, British Columbia; Map 1553A.

Muller, J.E. and Carson, D.J.T. (1969): Geology and Mineral Deposits of the Alberni Map Area, Van-

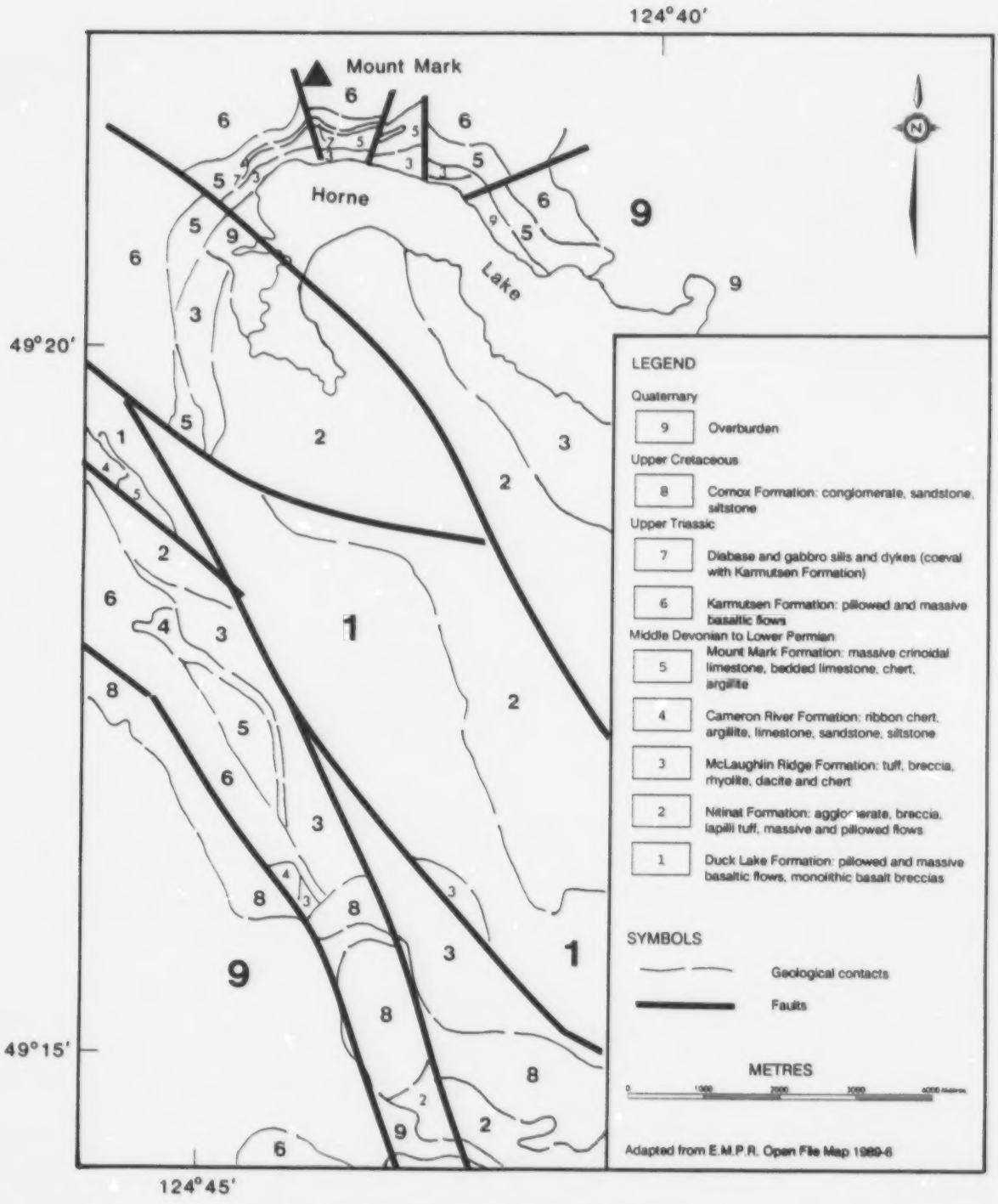
124°40'
Mount Mark
Horne
Lake
9
49°20'
49°15'
124°45'
LEGEND
Quaternary
9 Overburden
Upper Cretaceous
8 Comox Formation: conglomerate, sandstone, siltstone
Upper Triassic
7 Diabase and gabbro sills and dykes (coeval with Karmutsen Formation)
6 Karmutsen Formation: pillowed and massive basaltic flows
Middle Devonian to Lower Permian
5 Mount Mark Formation: massive crinoidal limestone, bedded limestone, chert, argillite
4 Cameron River Formation: ribbon chert, argillite, limestone, sandstone, siltstone
3 McLaughlin Ridge Formation: tuff, breccia, rhyolite, dacite and chert
2 Nitinat Formation: agglomerate, breccia, lapilli tuff, massive and pillowed flows
1 Duck Lake Formation: pillowed and massive basaltic flows, monolithic basalt breccias
SYMBOLS
Geological contacts
Faults
METRES
0 1000 2000 3000 4000 Meters
Adapted from E.M.P.R. Open File Map 1989-6

Figure 7. Geology of the Horne Lake area, Vancouver Island (92F/07E).

couver Island and Gulf Islands; Paper 68-50, 52 pages.

Sutherland Brown, A. Yorath, C.J., Anderson, R.G. and Dom, K. (1986): Geological Maps of Southern Vancouver Island, LITHOPROBE 1; Open File 1272, 10 Sheets.

Horne Lake NTS: 92F/07W
MINFILE No.: 92F 089 Latitude: 49°21'35"
Map No.: L001 Longitude: 124°43'47"

The Horne Lake occurrence is located approximately 12 kilometres north-northeast of Port Alberni. The deposit consists of a limestone bed of variable thickness that is exposed as an arc along the steep bluffs on the north and west sides of the lake (Figure 7). The limestone is overlain by massive to pillowed basalts of the Upper Triassic Karmutsen Formation and underlain by bedded tuffs and volcanic breccias of the McLaughlin Ridge Formation. Exposed thicknesses vary up to 360 metres, as revealed on the south face of Mount Mark on the north side of the lake. To the east and west the limestone thins to less than 120 metres. The unit is folded into a broad northwesterly plunging syncline that is segmented by a series of steeply dipping faults.

This deposit is comprised of medium to light grey, fine to coarse-grained, well-bedded recrystallized bioclastic limestone containing abundant crinoid remains. Thin sections display numerous whole and fragmented crinoid discs in a very fine grained limy mud matrix with minor secondary silica. At Mount Mark the limestone contains minor thin chert beds in the upper and lower parts of the exposed section. In the middle the limestone is interstratified with lenses and beds of argillite and tuff. Several gabbro sills intrude the limestone near the top of the section.

Development is limited to some mapping and sampling by B.C. Cement in the 1950s.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Massey, N.W.D., and Friday, S.J. (1989): Geology of the Alberni - Nanaimo Lakes Area, Vancouver Island (92F/1W, 92F/2E and part of 92F/7E); *in* Geological Fieldwork 1988, Paper 1989-1, pages 61-74.

Massey, N.W.D., Riddell, J. and Dur ais, S. (1989): Geology of the Port Alberni - Nanaimo Lakes Area (92F/1W,2 and part of 7); Open File 1989-6, Sheets 1, 2 and 4.

Mathews, W.H. and McCammon, J.W. (1957): Calcareous Deposits of Southwestern British Columbia; Bulletin 40, pages 49-51.

Geological Survey of Canada:

Sutherland Brown, A. Yorath, C.J., Anderson, R.G. and Dom, K. (1986): Geological Maps of Southern Vancouver Island, LITHOPROBE 1; Open File 1272, Sheet 4.

Anderson Bay NTS: 92F/09E
MINFILE No.: 92F 088 Latitude: 49°31'00"
Map No.: L002 Longitude: 124°08'33"

The Anderson Bay occurrence is located on the southeast coast of Texada Island, 43 kilometres northwest of Nanaimo. Marble was produced from several quarries up to 1917.

A limestone bed 37 to 60 metres thick extends northward for 1.7 kilometres. It is unconformably overlain by amygdaloidal basaltic flows and is underlain by

TABLE 5
ANALYSES OF SAMPLES OF MOUNT MARK LIMESTONE

Deposit	Map No.	ID	CaO %	MgO %	SiO_2 %	Al_2O_3 %	Insol. %	R_2O_3 %	Fe_2O_3 %	MnO %	P_2O_5 %	S %	LOI %	H_2O %
Anderson Bay	L002	1	33.02	16.20	4.94	0.85			1.56					
		2	47.9	2.16			2.49	2.01	0.74	0.05	0.07	0.005	43.0	0.11
Bonners Quarry	L003	3	44.65	3.92			11.2	0.41	0.5	0.12	0.06	0.05	39.1	
		4	40.9	8.46			5.0	0.76	0.42	0.09	0.04	0.09	40.8	0.12
Marble Bay	L004	5	51.5	0.84			5.70	0.28	0.10	0.02	0.04	0.011	41.4	0.13
Raymond	L005	6	53.5	0.35			3.3	0.21	0.19	0.02	0.04	0.02	42.37	0.04
Eagle Heights	L006	7	47.1	0.82			12.40							
Buttle Lake	L007	8	52.68	0.18			5.14	0.35	0.05	0.03	0.09	0.01	41.69	0.14

Notes

1. Sample from lens of fine-grained pink dolomite veined with calcite, near north end of deposit (Gouldie, 1944, p. 157).
2. Average of three chip samples, taken in succession across 27 m stratigraphic thickness (Mathews and McCammon, 1957, p. 49).
3. Average of two chip samples, each 14.6 m long, taken in succession across the width of the deposit (Mathews and McCammon, 1957, p. 45, Samples 1 and 2).
4. Chip sample along 12.2 m quarry face (Mathews and McCammon, 1957, p. 45, Sample 3).
5. Composite sample of chips taken at 3 m intervals across 61 m limestone north of Marble Bay on the south side of the peninsula (Mathews and McCammon, 1957, p. 47, Sample 2).
6. Average of three chip samples, each 12.2 m long, taken in succession along the quarry face (Mathews, 1947, p. 55).
7. Chip sample across 55 m (McCammon, 1973, p. 8).
8. Grab sample from quarry (McCammon, undated field notes).

mafic breccias, grey argillites and aphanitic volcanics. Bedding strikes north to northwest and dips 30° to 60° west. The bed pinches out to the south and is truncated to the north by a fault extending northwestward from Anderson Bay.

The deposit is comprised of coarse to fine-grained white to reddish brown crinoidal limestone. The lower 12 to 15 metres consists of white to pink crinoidal limestone that grades upward into 9 to 15 metres of banded, pink to red crinoidal limestone containing some jasper. This is overlain by red and green tuffaceous limestone.

Magnesian and high-calcium beds are present in the upper part of the deposit. Near the north end of the band lenticular masses of fine-grained pink dolomite, veined with white calcite, occur in the limestone. Analyses of a sample from one of these lenses, together with the average analysis of three chip samples taken in succession across a total stratigraphic thickness of 27 metres is given in Table 5.

Two small quarries were opened up on this deposit in the early 1900s. Nootka Quarries Ltd. operated a quarry on Lot 26, 380 metres northwest of the head of Anderson Bay. Continental Marble operated a second quarry 540 metres to the south on Lot 345. Up to 1916 96.7 tonnes (36 cubic metres) of marble were produced from this quarry for ornamental uses.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Hora, Z.D. and Sharman, K.J. (1980): Texada Island Limestone; *in* Geological Fieldwork 1979, Paper 1980-1, pages 109-111.

Mathews, W.H. and McCammon, J.W. (1957): Calcareous Deposits of Southwestern British Columbia; Bulletin 40, pages 47-49.

Melnyk, W. and Doborzynski, Z. (1986): Geological, Geochemical and Geophysical Report on the Sabine Claims; Assessment Report 15229

Canada Department of Mines and Resources

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 156-157.

Parks, W.A. (1917): Report on the Building and Ornamental Stones of Canada; Report 452, Volume 5, pages 149-155.

Bonner's Quarry NTS: 92B/12E
MINFILE No.: 92B 017 Latitude:48°41'16"
Map No.: L003 Longitude: 123°36'27"

Bonners Quarry is located 400 metres west of the Cobble Hill Station of the Esquimalt and Nanaimo Railway on Lot 12, 35 kilometres northwest of Victoria. Small scale quarrying operations have been carried out here periodically since 1947.

A quarry is developed in a limestone bed 30 metres thick that has been traced along strike for at least 120 metres. The limestone is underlain by black chert, which strikes 140° and dips steeply southwest on the east side of the quarry.

The deposit varies from a fine-grained, greenish grey dolomitic limestone to a coarse-grained, high-calcium, bioclastic limestone containing abundant organic fragments and pebbles in a fine-grained matrix. Nodules and irregular masses of chert are sometimes present.

Several thin sections display numerous crinoid discs and echinoid spines (?) with some bryozoan structures and shell fragments in a fine-grained, argillaceous calcite cement that is partially replaced by dolomite. Sampling results reported by Mathews and McCammon (1957) are presented in Table 5.

Limestone was produced periodically from a single quarry between 1947 and 1981 by Cobble Hill Lime Products. Between 1953 and 1981 31402 tonnes of limestone were quarried for agricultural use.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Mathews, W.H. (1947): Calcareous Deposits of the Georgia Strait Area; Bulletin 23, pages 54-55.

Mathews, W.H. and McCammon, J.W. (1957): Calcareous Deposits of Southwestern British Columbia; Bulletin 40, pages 44-45.

Marble Bay (Cowichan Lake) NTS: 92C/16E
MINFILE No.: 92C 016 Latitude: 48°50'11"
Map No.: L004 Longitude: 124°07'13"

The Marble Bay occurrence is situated on the east end of Cowichan Lake, 30 kilometres west-northwest of Duncan. A limestone bed 150 to 300 metres thick strikes northwest for 4.75 kilometres across the peninsula at the east end of the lake. It dips between 30° and 72° southwest. A few dikes intrude the limestone.

The formation consists of chert and well-bedded siliceous limestone interbedded with relatively pure, light grey to white, massive, fine to medium-grained limestone containing abundant crinoid fragments. Thin sections reveal numerous crinoid stems and sponge spicules. Sampling results reported by Mathews and McCammon (1957) are given in Table 5.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Mathews, W.H. and McCammon, J.W. (1957): Calcareous Deposits of Southwestern British Columbia; Bulletin 40, pages 46-47.

Massey, N.W.D., Friday, S.T., Tercier, P.E. and Rublee, V.J. (1987): Geology of the Cowichan Lake Area (92C/16); Open File 1987-2, Sheets 1 and 9.

Raymond (Cobble Hill) NTS: 92B/12E
MINFILE No.: 92B 019 Latitude: 48°40'35"
Map No.: L005 Longitude: 123°38'28"

The Raymond deposit is located 3 kilometres west-southwest of Cobble Hill Station of the Esquimalt and Nanaimo Railway, 35.5 kilometres northwest of Victoria. Limestone has been quarried here since 1886 for the manufacture of lime and cement.

This occurrence is comprised of a limestone lens that trends northeast for at least 670 metres. The lens varies up to 150 metres thick near its south end, where it is truncated by a northwest-trending fault that brings Karmutsen volcanics in contact with the limestone. To the northeast the deposit gradually thins, eventually pinching out between overlying volcanics and underlying sediments. Chert beds within the limestone strike 70° and dip 45° northwest. The underlying sediments strike 060° and dip 35° northwest.

This deposit is composed of fine to coarse-grained, light grey, strongly jointed, calcium to high-calcium limestone that is commonly veined with white calcite. In thin section the rock is seen to be composed mainly of crinoid fragments with bryozoa remains and possible radiolarian bodies in a partially recrystallized, dense, calcite cement. A series of discontinuous, light-coloured chert beds, 2.5 to 10 centimetres thick, and 15 to 90 centimetres apart, occur in the upper part of the limestone lens. Similar but less abundant chert beds are present near the lower contact. The limestone commonly contains less than 1 per cent magnesia (MgO). Sampling results reported by Mathews (1947) are summarized in Table 5.

Between 1886 and 1896 Raymond & Sons quarried limestone to produce lime from two small pits on the northeast end of the deposit.

British Columbia Cement Company Ltd. acquired the property and began quarrying limestone from the southwest end of the deposit in 1953 to supply the Bamberton cement plant. Production continued to 1980, when the deposit was largely exhausted. Between 1953 and 1979 11.8 million tonnes of limestone were quarried. The quarry, 950 metres long, is now flooded.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Mathews, W.H. (1947): Calcareous Deposits of the Georgia Strait Area; Bulletin 23, pages 55-56.

Mathews, W.H. and McCammon, J.W. (1957): Calcareous Deposits of Southwestern British Columbia; Bulletin 40, pages 45-46.

Canada Department of Mines and Resources

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, page 136.

Eagle Heights NTS: 92B/12E
MINFILE No.: 92B 118 Latitude: 48°39'55"
Map No.: L006 Longitude: 123°44'04"

This occurrence is located on the southeast side of Eagle Heights between 550 and 610 metres elevation, 32 kilometres northwest of Victoria. The deposit consists of a band of limestone 100 to 300 metres wide that trends westward for 1400 metres. The band is comprised of coarse-grained, light grey, fossiliferous limestone with chert and volcanic inclusions. The analysis of a chip sample taken by McCammon (1973) across 55 metres is reported in Table 5.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1973): Limestone Occurrences in B.C.; unpublished report in Industrial Mineral File, page 8.

Geological Survey of Canada:

Clapp, C.H. and Cooke, H.C. (1917): Sooke and Duncan Map-areas, Vancouver Island; Memoir 96, page 105, and accompanying Map 42A.

Buttle Lake NTS: 92F/12E
MINFILE No.: 92F 422 Latitude: 49°39'13"
Map No.: L007 Longitude: 125°31'15"

A band of Pennsylvanian limestone extends for 11 kilometres along the east side of Buttle Lake, near its south end. The unit dips gently northeast to southeast. Several faults cut the limestone which is underlain near its south end by a gabbro sill.

A quarry and a highway exposure 500 metres north of the quarry, near the north end of the band, expose light grey limestone with large crinoid plates and chert nodules and bands. The analysis of a grab sample taken from the quarry by McCammon is included in Table 5.

A small quarry was excavated on the east shore of Buttle Lake, 22.4 kilometres south of the Gold River road bridge, sometime before 1973.

Selected Bibliography:

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1973): Limestone Occurrences in B.C.; unpublished report in Industrial Mineral File, page 12.

QUATSINO FORMATION

The Quatsino Formation contains the most significant limestone resources situated on or near tidewater along the British Columbia coast. The formation was named for the extensive outcrops of limestone of Late Triassic age occurring on Quatsino Sound on northern Vancouver Island. Similar limestone on Texada Island, previously referred to as Marble Bay Formation, is included with the Quatsino Formation (Muller and Carson, 1968). On southern Vancouver Island most Upper Triassic limestones were initially mapped as the Sutton limestone. These have also been incorporated into the Quatsino Formation. The Sutton limestone is now restricted to the latest Triassic limestone member of the Parsons Bay Formation (Muller, 1982; Massey and Friday, 1987).

The Quatsino Formation is conformably underlain by basalts and andesites of the Karmutsen Formation. In places these volcanic rocks are intercalated with the limestone, such as in the Cowichan Lake area on southern Vancouver Island. The Quatsino limestone grades upward into thinly bedded black limestone and black calcareous argillite of the Parsons Bay Formation.

On northern Vancouver Island the formation outcrops in three major belts that are segmented by faults and intruded by granitic stocks and batholiths of the Jurassic Island plutonic suite (Map 1). The most significant of these is a discontinuous belt that extends southeastward for 165 kilometres from the north side of Quatsino Sound to Tlupana Inlet (Quatsino-Tlupana belt). Farther east a second belt outcrops to the east and south of Nimpkish Lake, generally trending north-northwest for 39 kilometres (Nimpkish belt). A third belt begins just west of Telegraph Cove on the north coast and follows the Kokish and Bonanza rivers southward to Bonanza Lake, for a total length of 30 kilometres (Bonanza belt). The Quatsino limestone displays its greatest thickness in these three belts. A section just south of Alice Lake in the Quatsino-Tlupana belt exposes 760 metres of limestone.

On central and southern Vancouver Island the Quatsino Formation occurs as smaller, sporadically distributed limestone masses, much complicated by faulting and folding. The limestone thins considerably from northern Vancouver Island towards the south. Near Cowichan Lake the unit is less than 75 metres thick.

Near the south end of the island a discontinuous carbonate horizon containing the Bamberton and Tod Inlet deposits extends from Cordova Bay northwestward across Saanich Inlet to the east shore of Shawnigan Lake, just south of Strathcona (Cordova-Shawnigan belt). Its general fine-grained, massive character, its association with greenstones and its apparent susceptibility to host magnetite-sulphide skarns suggest this horizon is correlative to the Quatsino Formation.

Two large masses of Quatsino limestone, referred to here as the northern and southern belts, outcrop on Texada Island. The northern belt, with a strike length of 13 kilometres and up to 3 kilometres wide, extends from the north end of the island south towards Gillies Bay (Map 2). It is preserved along the axis of a broad northwesterly plunging syncline that is complicated by subsidiary folds. The southern belt (Davie Bay deposit) trends northward along the west coast of the island for 6 kilometres within a tilted fault block.

The Quatsino Formation is composed largely of massive to thickly bedded, fine-grained (micritic), black to light grey, bluish grey weathering limestone. The rock is predominantly calcium to high- calcium in composition. Silica contamination in the form of chert nodules and beds is fairly common. The limestone in the northern belt can be separated into three members, each at least 100 metres thick, based on composition (Mathews, 1947; Mathews and McCammon, 1957). The lower member composed exclusively of high-calcium limestone is overlain by a middle member of generally calcium limestone, which is in turn overlain by an upper member of magnesian limestone.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Eastwood, G.E.P. (1968): Geology of the Kennedy Lake Area; Bulletin 55, pages 19-21.

Massey, N.W.D. and Friday, S.J. (1987): Geology of the Cowichan Lake Area, Vancouver Island (92C/16); *in* Geological Fieldwork 1986, Paper 1987-1, pages 223-229.

Massey, N.W.D., Friday, S.T., Tercier, P.E. and Rublee, V.J. (1987): Geology of the Cowichan Lake Area (92C/16); Open File 1987-2, 9 sheets.

Mathews, W.H. and McCammon, J.W. (1957): Calcareous Deposits of Southwestern British Columbia; Bulletin 40.

Webster, I.C.L. and Ray, G.E. (1990): Geology and Mineral Deposits of Northern Texada Island (92F/9, 10 and 15); *in* Geological Fieldwork 1989, Paper 1990-1, pages 257-270.

Webster, I.C.L. and Ray, G.E. (1990): Geology and Mineral Deposits of Northern Texada Island (92F/9,10,15); Open File 1990-3.

Geological Survey of Canada:

Hoadley, J.W. (1953): Geology and Mineral Deposits of the Zeballos - Nimpkish Area, Vancouver Island, British Columbia; Memoir 272, pages 17-21.

Muller, J.E. (1969): Alberni, British Columbia; Map 17-1968.

Muller, J.E. (1977): Geology of Vancouver Island; Open File 463.

Muller, J.E. (1982): Geology of Nitinat Lake Map Area, British Columbia; Open File 821.

Muller, J.E. (1985): Geology, Victoria, British Columbia; Map 1553A.

Muller, J.E., Cameron, B.E.B. and Northcote, K.E. (1981): Geology and Mineral Deposits of the Nootka Sound Map Area, Vancouver Island, British Columbia; Paper 80-16, page 11 and accompanying Map 1537A, Nootka Sound, British Columbia.

Muller, J.E. and Carson, D.J.T. (1969): Geology and Mineral Deposits of the Alberni Map Area, Vancouver Island and Gulf Islands; Paper 68-50, pages 14-15.

Muller, J.E., Northcote, K.E. and Carlisle, D. (1974): Geology and Mineral Deposits of the Alert Bay - Cape Scott Map Area, Vancouver Island, British Columbia; Paper 74-8, pages 12-15 and accompanying Map 4-1974.

Muller, J.E. and Roddick, J.A. (1983): Geology of Alert Bay - Cape Scott, B.C.; Map 1552A.

Sutherland Brown, A. Yorath, C.J., Anderson, R.G. and Dom, K. (1986): Geological Maps of Southern Vancouver Island, LITHOPROBE 1; Open File 1272, 10 sheets.

Texada Island

Ideal Cement NTS: 92F/10E
MINFILE No.: 92F 395;
92F 139 Latitude: 49°43'09"
Map No.: L008 Longitude: 124°33'46"

The main quarry (MINFILE 92F 395; Map 2) is located on Lot 25, 3 kilometres east of Davis Bay on the west coast of Texada Island. Limestone has been quarried here since 1945.

The quarry is situated near the western margin of the northern belt. Underlying basaltic flows of the Karmutsen Formation outcrop to the southwest. The strata strike northwest and dip 12° to 15° northeast. Limestone is quarried from the upper part of the lowest member of the Quatsino limestone, consisting of at least 200 metres of exclusively high-calcium limestone. Within the quarry the limestone is cut by mafic dikes 0.3 to 4.5 metres wide that commonly strike 015° and dip vertically. A second set of dikes, 0.3 to 0.9 metres wide, strikes 135°.

The deposit is comprised of uniformly, fine-grained, black to medium grey, light grey weathering limestone with minor veinlets containing quartz and pyrite. The analysis of a sample taken across 9.45 metres of strata exposed in the face of the north quarry in 1956 is given in Table 6. Reserves are currently estimated at 265 million tonnes averaging 54.3 per cent CaO (97% $CaCO_3$) (Peter Stiles, General Manager, 1989, personal communication)

Limestone was initially produced periodically from three small quarries by Stanley Beale between 1945 and 1956. Since 1958 Holnam West Materials Ltd. (formerly Ideal Cement Company) has been producing limestone from one large quarry with a current (1990) production rate of 2.5 million tonnes a year. The majority of this production is used for cement manufacturing. Between 1952 and 1987 27.5 million tonnes of limestone have been quarried.

Holnam operates the White-rock quarry (MINFILE 92F 139; Map 2, L8) 0.6 kilometres northwest of the south end of Paxton Lake and 2.5 kilometres southeast of the main quarry. The quarry is situated approximately 200 metres southwest of the contact with the underlying basaltic volcanics. Holnam began quarrying this deposit for its white limestone in 1987. The company currently (1990) produces 25 000 to 30 000 tonnes of white limestone per year for export to the United States for filler applications (H. Diggon, 1990, pers. comm.). The limestone contains at least 98 per cent $CaCO_3$, with less than 1 per cent SiO_2 and brightnesses of 88 to 96 per cent (green filter) (H. Diggon, Operations Manager, 1990, personal communication).

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Mathews, W.H. and McCammon, J.W. (1957): Calcareous Deposits of Southwestern British Columbia; Bulletin 40, pages 78-79.

TABLE 6
ANALYSES OF QUATSINO (MARBLE BAY) LIMESTONE, TEXADA ISLAND

Deposit	Map No.	ID	CaO %	MgO %	SiO_2 %	Al_2O_3 %	Insol. %	R_2O_3 %	Fe_2O_3 %	MnO %	P_2O_5 %	S %	LOI %	H_2O %
Ideal Cement	L008	1	54.3	0.24			0.78	0.22	0.07	0.003	0.004	0.01	43.7	0.14
Blubber Bay, No. 2	L009	2	55.34	0.46			0.20	0.01	0.04	0.010	0.017	0.02	43.89	0.01
Beale Quarries	L010	3	55.36	0.76			0.33	0.21	0.05	0.010	0.008	0.02	43.14	0.06
Domtar No. 4	L011	4	55.17	0.02			0.65	0.06	0.06	0.004	0.011	0.03	43.62	0.07
McKay Quarry	L012	5	54.7	0.47			0.78	0.06	0.04	0.003	0.018	0.01	43.6	0.12
		6	54.9	0.36			0.68	0.06	0.11	0.002	0.010	0.02	43.7	0.12
Davie Bay	L014	7	38.11	13.88	1.72	1.03			0.63					
		8	53.79	1.53			0.29	0.24	0.082	0.005	0.015	0.038	44.00	0.07
Blubber Bay	L015	9	53.86	0.74			1.23	0.40	0.16	0.020	0.027	0.04	43.52	0.08
		10	48.80	0.80			8.64	2.13	0.33	0.019	0.052	0.02	38.99	0.12
Marble Bay	L017	11	51.93	3.96			1.12	0.39	0.25	0.035	0.013	0.059	42.41	0.05
Eagle Cove	L018	12	52.97	2.48			0.98	0.29	0.24	0.033	0.016	0.06	43.04	0.02
		13	55.14	0.48			0.43	0.16	0.11	0.031	0.023	0.05	43.55	0.04
Fogh Property	L019	14	40.97	12.57			0.75	0.65	0.50	0.109	0.013	0.07	44.67	0.05
		15	54.23	0.83	0.50	0.08			0.11			nil		
Johnson	L020 Quarries	16	52.70	1.68			1.86	0.10	0.16	0.005	0.017	0.06	43.30	0.14

Notes

1. *Sample across 9.45 m in the face of the north quarry in 1956 (Mathews and McCammon, 1957, p. 78, Sample 4).*
2. *Average of two chip samples taken in succession across 12.1 m of high-calcium limestone in Blubber Bay No. 2 quarry (Mathews and McCammon, 1957, p. 65).*
3. *Average of eleven chip samples taken in succession over a total length of 143 m across the face of the No. 2 quarry in 1944 (Mathews and McCammon, 1957, p. 76).*
4. *Average of two chip samples taken in succession along a 54 m face at the north end of No. 4 quarry in 1956 (Mathews and McCammon, 1957, p. 65, Samples 5 and 6).*
5. *A sample of random chips of white limestone (Mathews and McCammon, 1957, p. 79, Sample 1).*
6. *A sample of random chips of black limestone (Mathews and McCammon, 1957, p. 79, Sample 2).*
7. *Sample of magnesian limestone from Davie Bay deposit (Goudge, 1944, p. 157).*
8. *Average of five chip samples taken in succession over a total width of 381 m at the south end of the Davie Bay deposit (Mathews and McCammon, 1957, p. 82).*
9. *Average of five chip samples taken in succession across 152 m of high-calcium limestone, excluding 30.5 m of feldspathic limestone in the centre of the section (Mathews and McCammon, 1957, p. 69).*
10. *Chip sample across 30.5 m of feldspathic limestone in centre of high-calcium section, see Note 9 above (Mathews and McCammon, 1957, p. 69).*
11. *Average of nine chip samples from the east and west ends of the main quarry (Mathews and McCammon, 1957, p. 73).*
12. *Average of four chip samples taken in succession across 244 m of calcium to high-calcium limestone of the middle member (Mathews and McCammon, 1957, p. 72).*
13. *Average of four chip samples, taken southwest of the previous sample, across 244 m of high-calcium limestone of the lower member (Mathews and McCammon, 1957, p. 72).*
14. *Average of three chip samples taken in succession across 91 m of magnesian limestone (Mathews and McCammon, 1957, p. 67).*
15. *White high-calcium limestone west of the magnesian limestone in the previous sample (Goudge, 1944, p. 157, Sample 10B).*
16. *Chip sample across 11.6 m of limestone in the west quarry (Mathews and McCammon, 1957, p. 78, Sample 3).*

Blubber Bay (Ash Grove Cement) NTS: 92F/15E
MINFILE No.: 92F 479 Latitude: 49°47'08"
Map No.: L009 Longitude: 124°37'17"

The Blubber Bay quarries are located on Lot 13 along the southwest shore of Blubber Bay at the north end of Texada Island (Map 2). The deposit is situated on the west flank of the northern limestone belt. Locally, the limestone is deformed into a broad dome centered on the southwest corner of the No. 2 quarry. Dips range from less than 10° near the centre of the dome to 40° in the No. 3 quarry, 150 metres to the northwest. The dome is complicated by a few steeply dipping faults with displacements of up to 3 metres. The quarries are developed in the upper part of the high-calcium lower member and in the lower part of the more magnesian middle member of the Quatsino Formation. The deposit is intruded by a few steeply dipping, dominantly west-trending diorite and greenstone dikes a few centimetres to 6 metres wide.

The limestone is generally fine grained and black to dark bluish grey in colour. In places irregular vein-like masses of white limestone occur in the dark limestone, probably due to the bleaching effect of solutions moving along fractures. Dolomite and quartz occur as fine disseminations and as veinlets in the middle member.

Analyses of chip samples reported by Mathews and McCammon (1957) are in Table 6. Remaining reserves (1989) in the No. 6 quarry, just south of the No. 2 quarry are as follows (R. Grainger, Mine Manager, 1989, personal communication):

- 5 years of chemical grade limestone (less than 5% MgO, greater than 98% $CaCO_3$)
- 10 years of cement grade limestone (up to 1.5% MgO, 93% $CaCO_3$)
- 300 years of agricultural limestone

Limestone was initially produced periodically from two small quarries by various operators between 1890 and 1910 for lime manufacturing. In 1910 Pacific Lime Company took over the operation, producing limestone from three larger quarries (Nos. 1 to 3) along the shore of

Blubber Bay up to 1948. In 1966 a new quarry (No. 6) was opened by Domtar Inc. a kilometre south of Blubber Bay and is now operated by Ashgrove Cement West Inc. at a rate of approximately 1.5 million tonnes a year (1989). Most of the current production is consumed in cement manufacturing. Total production between 1911 and 1987 amounted to 18.5 million tonnes.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources

Mathews, W.H. (1947): Calcareous Deposits of the Georgia Strait Area; Bulletin 23, pages 70-74.

Mathews, W.H. and McCammon, J.W. (1957): Calcareous Deposits of Southwestern British Columbia; Bulletin 40, pages 60-66.

Canada Department of Mines and Resources

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 144-147.

Lafarge/Beale Quarries NTS: 92F/10E, 15E
MINFILE No.: 92F 396 Latitude: 49°45'02"
Map No.: L010 Longitude: 124°31'41

These quarries are located on Lots 7, 8 and 499 along the east coast of Texada Island, 1.5 kilometres east-southeast of the town of Vananda (Map 2). Limestone has been produced here since 1933.

This deposit is situated on the east margin of the northern limestone belt. The limestone has been quarried from the upper part of the lower high-calcium member and the lower part of the middle calcium member of the Quatsino Formation. Bedding generally dips southwest from 20° to 40°. In the No. 1 quarry and the western part of the No. 2 quarry (1956) the strata are intensely folded and faulted, probably due to the intrusion of a stock of quartz diorite just west of the quarries (Mathews and McCammon, 1957, page 74). This stock trends northwest along the shore for 760 metres. The limestone is commonly cut by andesitic dikes a few centimetres to 12 metres wide. Most dikes strike 070° and dip 70° to 80° southeast. Fifty per cent of the exposure near the bottom of the No. 2 quarry (main quarry) is dike. Near the top of the quarry the amount of dike rock decreases to 20 per cent.

The limestone is generally fine grained and black. It becomes medium to coarse grained and grey in colour within 600 metres of the quartz diorite stock. The lower high-calcium member is quite uniform in composition while the middle member displays alternating beds of magnesian and calcium limestone, with the calcium limestone predominant. The middle member is commonly cut by calcite and dolomite veinlets. The average analysis of eleven chip samples reported by Mathews and McCammon (1957) is given in Table 6. The average grade of limestone produced from the No. 2 quarry in 1985 was 52.94 per cent CaO, 1.0 per cent MgO, 2.59 per cent SiO_2, 1.23 per cent Al_2O_3, 0.45 per cent Fe_2O_3, 0.13 per cent Na_2O, 0.09 per cent K2O and 42.59 per cent ignition loss and remaining reserves are estimated at 40 million tonnes (Randy Gue, former Quarry Superintendent, 1989, personal communication).

Limestone was first quarried here by F.J. Beale and Beale Quarries Ltd. from two larger quarries on the coast (Nos. 1 and 2) and three smaller quarries to the west and south (Nos. 3, 4 and 5). In 1956 Lafarge Canada Inc. acquired the operation and continued production from the No. 2 quarry on Lot 499 up to mid-1986. Between 1933 and 1986 22.8 million tonnes of limestone were quarried.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Lafreniere, C. (1984): Report on Dikes Evaluation, Vananda Quarry; unpublished report for Canada Cement Lafarge, in Industrial Mineral File Mathews, W.H. (1947): Calcareous Deposits of the Georgia Strait Area; Bulletin 23, pages 81-85

Mathews, W.H. and McCammon, J.W. (1957): Calcareous Deposits of Southwestern British Columbia; Bulletin 40, pages 74-77.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 153-155.

Hiesholt Lake
(Domtar Quarries 4 & 5) NTS: 92F/15E
MINFILE No.: 92F 397 Latitude: 49°46'09"
Map No.: L011 Longitude: 124°35'37"

Limestone was quarried 2.5 kilometres south of Blubber Bay in the centre of Lot 305 (Map 2), on the north end of Texada Island, up to 1966. The quarries are situated on the west flank of the northern limestone belt and are developed in the lower member of the Quatsino limestone. Four steeply dipping dikes, 3 to 6 metres wide are each exposed for approximately 100 metres in the No. 4 (south) quarry. One of these strikes west, while the rest trend northerly. A few faults and zones of shattering and shearing are present.

The limestone is generally a uniform fine-grained, massive, black rock. Two subvertical zones of interbanded

black and white limestone, 4.6 to 6 metres wide, are exposed in the walls of the No. 4 quarry. The average analysis of two chip samples reported by Mathews and McCammon (1957) is given in Table 6.

Pacific Lime Ltd. and Domtar Inc. produced limestone from the adjoining Nos. 4 and 5 quarries between 1948 and 1966. Total production amounted to 5.5 million tonnes. The quarries are now abandoned and flooded.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Mathews, W.H. and McCammon, J.W. (1957): Calcareous Deposits of Southwestern British Columbia; Bulletin 40, pages 63-66.

Imperial Limestone (McKay Quarry) NTS: 92F/10E
MINFILE No.: 92F 394 Latitude: 49°44'28"
Map No.: L012 Longitude: 124°31'35"

The McKay quarry is located near the centre of Lot 500, 1.25 kilometres southwest of Sprat Bay near the north end of Texada Island (Map 2). The quarry lies just south of the Lafarge/Beale Quarry (L010). Limestone has been quarried here since 1951.

This quarry is developed near the eastern edge of the northern limestone belt, within the lowest member of the Quatsino Formation. Several steeply dipping, west-striking faults are exposed in the quarry. A few hundred metres to the southwest the limestone is in fault contact with basaltic flows of the Karmutsen Formation.

The deposit consists of steeply dipping zones of white limestone in black limestone, with gradational and sharp contacts separating the two types. Both types are fine grained. The white colour is probably the result of the bleaching of black limestone by hydrothermal fluids percolating along a system of vertical joints (Mathews and McCammon, 1957, pages 63, 79). Analyses of randomly collected chips of black and white limestone reported by Mathews and McCammon (1957) are in Table 6.

This deposit was initially quarried by Don McKay between 1951 and 1958. Imperial Limestone Ltd. acquired the property in 1959 and has continued operating the quarry to the present day. The white limestone is mined selectively and barged to Seattle where it is ground to make a variety of products (fillers, extenders, etc.). The black limestone is occasionally sold to pulp mills. Some 170 000 tonnes of limestone are currently (1989) mined every year. Between 1952 and 1987 production totalled 4.56 million tonnes.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Mathews, W.H. and McCammon, J.W. (1957): Calcareous Deposits of Southwestern British Columbia; Bulletin 40, pages 79-80.

Will Claims (Raven Bay) NTS: 92F/10E
MINFILE No.: 92F 363 Latitude: 49°43'53"
Map No.: L013 Longitude: 124°31'14"

A test quarry was opened up on a limestone deposit on the Will 3 claim (Lot 198), 1.7 kilometres south-southwest of the head of Raven Bay on the east coast of Texada Island (Map 2). It lies near the eastern edge of the northern limestone belt within the lower high-calcium limestone member of the formation. Moderately westward dipping basaltic flows of the underlying Karmutsen Formation outcrop just east of the quarry. The limestone is estimated to be at least 150 metres thick in this vicinity.

Diamond drilling within and around the test quarry between 1973 and 1975 encountered dark grey to black, fine-grained, massive limestone with some coarse-grained, medium to light grey limestone down to a depth of at least 65.5 metres (Hole 75-3). The core is cut by pyrite and calcite veins and by a few andesitic dikes; seven northwest and northeast trending diorite dikes varying up to 9 metres in width, outcrop mostly south of the quarry. Narrow zones of silicification and pyritization are present in addition to occasional green "schist inclusions" (sheared dikes ?). The limestone is brecciated in a few instances.

The deposit is inferred to contain 136 million tonnes of limestone over a 600 by 900 metre area down to a depth of 90 metres, with a minimum of 53.2 per cent CaO (95% $CaCO_3$), less than 1 per cent MgO and less than 2 per cent SiO_2 (O'Connor 1970, p. 10; MacLeod, 1978, p. 5). Diamond drilling and surface sampling were carried out in two areas, Block A and Block B, up to 1954. Block A, located on the Kelly-Jo fractional claim 150 to 300 metres north of the quarry, contains 500 000 tonnes in measured geological reserves averaging 54.40 per cent CaO, 0.25 per cent MgO, 2.27 per cent insolubles, 0.23 per cent Al_2O_3, 0.260 per cent Fe_2O_3, less than 0.015 per cent MnO_2, less than 0.050 per cent P_2O_5, 0.060 per cent sulphur, 0.56 per cent carbonaceous matter and 41.780 per cent CO_2 (Dolmage, 1954, p. 6). Block B, located on the Will 3 claim just east of the quarry, has indicated reserves of 295 000 tonnes averaging 55.33 per cent CaO, 0.32 per cent MgO, 1.6 per cent insolubles, 0.160 per cent Al_2O_3, 0.160 per cent Fe_2O_3, less than 0.006 per cent MnO_2, 0.046 per cent P_2O_5, 0.053 per cent sulphur, 0.290

per cent carbonaceous matter and 42.220 per cent CO_2 (Dolmage, 1954, p. 6).

Vantex Lime Company carried out an extensive program of surface sampling and diamond drilling on the property up to 1954. Texada Lime Ltd. diamond drilled the property between 1973 and 1975 to test its potential for limestone and copper-bearing skarn deposits.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Dolmage, V. (1954): Raven Bay Limestone Deposits; unpublished report in Industrial Mineral File.

Henry, J. and MacDonald, A. (1975): Diamond Drilling Report on the Will Claim; Assessment Report 5793.

Inverarity, J. (1974): Diamond Drilling Report on the Will and Wip Claims; Assessment Report 4903.

MacLeod, J.W., (1978): Texada Lime Ltd., Raven Bay Property; unpublished report in Industrial Mineral File.

O'Connor, J.T. (1970): Raven Bay Limestone; unpublished report in Industrial Mineral File.

Texada Lime Ltd. (1973); diamond drill core logs in Industrial Mineral File.

Davie Bay NTS: 92F/09W
MINFILE No.: 92F 104 Latitude: 49°36'25"
Map No.: L014 Longitude: 124°21'55"

This deposit comprises the southern limestone belt, which extends northwestward for 6.4 kilometres, parallel to the adjacent west coast of Texada Island between Davie Bay and Mouat Bay (Map 1). The belt has a maximum exposed width of 1600 metres. The limestone dips southwest, with underlying basaltic flows of the Karmutsen Formation outcropping along the northeast margin of the belt. To the southwest the limestone is in fault contact with the Karmutsen volcanics. The unit is possibly up to 300 metres thick.

Diamond drilling on the Paul claim group in 1973 and 1974 intersected up to 100 metres of limestone without encountering the underlying volcanics. Dikes within the limestone are rare.

This belt is generally composed of fine-grained, medium to light grey, high-calcium limestone frequently cut by calcite veins. In places tiny dolomite crystals are disseminated in the limestone. On Lot 25 high-calcium limestone is interbedded with magnesian limestone. Analyses reported by Mathews and McCammon (1957) are given in Table 6.

B.C. Cement Co. Ltd. initially carried out some exploration work near the south end of the deposit in the 1950s. Lafarge Canada Inc. drilled 31 holes on the north end of the deposit, near Mouat Bay, in 1973 and 1974. The company conducted a total-field magnetometer survey over the area of drilling in 1985 to test for the presence of dikes within the limestone.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Hora, Z.D. and Sharman, K.J.(1980): Texada Island Limestone; *in* Geological Fieldwork 1979, Paper 1980-1, pages 109-111.

Lavaque, J. (1986): Geological and Geophysical Report on the Paul 1-45 Claims; Assessment Report 14817.

Mathews, W.H. (1947): Calcareous Deposits of the Georgia Strait Area; Bulletin 23, pages 87-88.

Mathews, W.H. and McCammon, J.W. (1957): Calcareous Deposits of Southwestern British Columbia; Bulletin 40, pages 80-82.

Savelieff, R. (1974): Drilling Report on the Paul Claims; Assessment Report 5273.

B.C. Cement (Blubber Bay) NTS: 92F/15E
MINFILE No.: 92F 471 Latitude: 49°48'05"
Map No.: L015 Longitude: 124°36'16"

This deposit is located on the north end of the northern limestone belt on Lot 12 on the east side of Blubber Bay (Map 2). Limestone was quarried here by B.C. Cement Co. Ltd. between 1929 and 1957. Locally, the limestone is folded into a northwest-plunging anticline that is itself comprised of minor tight folds up to a few metres across. The core of the anticline is occupied by the lower member of the Quatsino Formation, which outcrops as a northwest-trending belt of high-calcium limestone. The overlying middle and upper members are exposed along the limbs of the anticline as two subparallel belts of calcium and magnesian limestone extending southeastwards from Blubber Bay and Grilse Point. A northeast- trending stock of diorite-gabbro, 300 metres long, intrudes the limestone along the east shore of Blubber Bay. Numerous northerly to westerly trending greenstone and diorite dikes extend outward from this stock.

The high-calcium limestone in the core of the fold is grey, granular and commonly foliated, while to the southwest it becomes black and fine grained. The magnesian limestone tends to have a more uniform creamy colour. The average analysis of a series of five chip samples taken in succession across 152 metres of high- calcium limestone in the centre of the property is given in Table 6. A 30.5-metre band near the middle of the section, contaminated with some cream coloured feldspathic material, was sampled separately.

Limestone was produced from four quarries located along the east shore of Blubber Bay, the largest being the No. 4 quarry at Grilse Point. Production between 1929 and 1957 totalled 2.1 million tonnes of limestone.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Mathews, W.H. (1947): Calcareous Deposits of the Georgia Strait Area; Bulletin 23, pages 75-78.

Mathews, W.H. and McCammon, J.W. (1957): Calcareous Deposits of Southwestern British Columbia; Bulletin 40, pages 67-71.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 148-150.

December Claims NTS: 92F/10E
MINFILE No.: 92F 495 Latitude: 49°44'13"
Map No.: L016 Longitude: 124°32'42"

The December claims are located 2.5 kilometres south of Vananda, 1.5 to 3.5 kilometres due east of Raven Bay, near the eastern edge of the northern limestone belt (Map 2). In this vicinity the strata are generally flat lying. The deposit appears to be in the middle member of the Quatsino Formation.

The claims are underlain by very fine grained, uniform, creamy white to grey to black limestone. Thin sections show the limestone is comprised mostly of a ground-mass of calcite crystals less than 0.10 millimetre in diameter containing larger grains 0.3 to 0.6 millimetre in diameter, either scattered throughout the ground-mass or confined to bands within it. The "burnability" of the limestone (degree to which it is altered to lime on heating) was found to improve with smaller grain size.

Grab sampling indicates three zones of limestone containing less than 2.5 per cent magnesia. Average grades and reserve estimates for the three zones are presented as follows (Dolmage, 1964, pages 14-15):

	CaO (%)	MgO (%)	Reserves (Mt)
West Zone	54.65	2.15	3.18
Central Zone	-	1.49	2.27
East Zone	55.26	1.02	2.04

Reserves for all three zones have been estimated to a depth of 50 feet (15.2 metres).

The deposit was evaluated by Lafarge Canada Inc. in 1964 for limestone suitable for use in kraft pulp mills. Sixty grab samples were taken.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Dolmage V. (1964): Geological Report on the December Claim; Assessment Report 612.

Marble Bay (Sturt Bay) NTS: 92F/15E
MINFILE No.: 92F 095 Latitude: 49°45'35"
Map No.: L017 Longitude: 124°33'53"

Limestone was quarried sporadically on Lot 1 near the west shore of Marble Bay, the south arm of Sturt Bay, on the east coast of Texada Island (Map 2) between 1898 and 1962.

This deposit is within the northern limestone belt. The limestone in the vicinity of Marble Bay is folded into an open anticline that plunges gently southeast. The various quarries are developed in the upper part of the middle calcium-limestone member of the Quatsino Formation, some 600 metres above the base of the unit. A few steeply dipping, north to northwest-striking faults are evident. The limestone is intruded by a small diorite-gabbro stock and several north to northeast-trending dikes are exposed in the quarries.

The deposit is composed mostly of fine-grained, black to light grey calcium and high-calcium limestone with some pale brown to greenish grey magnesian limestone contaminated with serpentine and other magnesium silicates. Analytical results reported by Mathews and McCammon (1957) are in Table 6.

Limestone was produced from one large quarry and several smaller quarries on the west shore of Marble Bay by various operators between 1898 and 1962, mostly by W.S. Beale between 1946 and 1956. Production between 1917 and 1956 amounted to 472 798 tonnes of limestone.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Mathews, W.H. (1947): Calcareous Deposits of the Georgia Strait Area; Bulletin 23, pages 80-81.

Mathews, W.H. and McCammon, J.W. (1957): Calcareous Deposits of Southwestern British Columbia; Bulletin 40, pages 72-74.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 152-153.

Parks, W.A. (1917): Report on the Building and Ornamental Stones of Canada; Report 452, Volume 5, page 160.

Eagle Bay (McMillan Lime) NTS: 92F/15E
MINFILE No.: 92F 477 Latitude: 49°46'13"
Map No.: L018 Longitude: 124°34'40"

This deposit is located within the northern limestone belt on the northern half of Lot 3, adjacent to Eagle Cove on the northeast coast of Texada Island (Map 2).

In the vicinity of Eagle Cove the three members of the Quatsino limestone outcrop on the eastern limb of an anticline that continues northward to the B.C. Cement property (L015). The upper magnesian member extends southeastward from Grilse Point along the coast past Eagle Cove to Sturt Bay. The underlying middle calcium to high-calcium member and the lower high-calcium member outcrop as parallel belts flanking the magnesian limestone to the southwest. The beds are locally warped into a series of open northwest-plunging folds with dips usually not exceeding 40°. Greenstone dikes are present but not as common as on Blubber Bay to the north.

The limestone is generally fine grained and bluish grey in colour. Analytical results reported by Mathews and McCammon (1957) are given in Table 6.

This deposit was sampled and mapped by McMillan Lime Company in 1944 and diamond drilled by Domtar Inc. in 1973.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Mathews, W.H. (1944): maps and assays of chip sampling, in Industrial Mineral File.

Mathews, W.H. (1947): Calcareous Deposits of the Georgia Strait Area; Bulletin 23, pages 78-80.

Mathews, W.H. and McCammon, J.W. (1957): Calcareous Deposits of Southwestern British Columbia; Bulletin 40, pages 71-72.

McMillan Lime Company (1944): assays from sampling, in Industrial Mineral File.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, page 151.

Fogh Property (Blubber Bay) NTS: 92F/15E
MINFILE No.: 92F 474 Latitude: 49°47'31"
Map No.: L019 Longitude: 124°36'15"

Some limestone was produced up to 1931 from several quarries located on Lot 9, just southeast of Blubber Bay on the north end of Texada Island (Map 2).

In the western part of the property the limestone is gently folded. This deformation becomes more intense and complex to the east. Bedding in a quarry northeast of the Paris mine strikes 178° and dips 35° to 90° east. West-trending dikes commonly cut the limestone and a few small diorite-gabbro stocks have intruded the limestone near the Paris mine.

To the west the limestone is fine grained, dark bluish grey to black, and high calcium in composition . To the east fine to medium-grained, cream to light brown magnesian limestone forms a northwest-trending band crossing the northeastern quadrant of Lot 9. Analyses of samples of both magnesian and high calcium limestone are given in Table 6.

Limestone was produced from several small quarries on the northern part of Lot 9, the largest being just northeast of the Paris mine in the northeast corner of the lot. In 1929 Western Lime Producers Company Inc. quarried 962 tonnes; the property was then leased to Petrie Lime Company, which quarried 7394 tonnes in 1931.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Mathews, W.H. (1947): Calcareous Deposits of the Georgia Strait Area; Bulletin 23, pages 74-75.

Mathews, W.H. and McCammon, J.W. (1957): Calcareous Deposits of Southwestern British Columbia; Bulletin 40, pages 66-67.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 147-148, 157.

Johnson Quarries NTS: 92F/10E
MINFILE No.: 92F 476 Latitude: 49°44'24"
Map No.: L020 Longitude: 124°33'20"

Limestone was produced up to 1955 from two small quarries on Lot 492, 350 metres south of the east end of Priest Lake on northern Texada Island (Map 2). The quarries are situated near the western margin of the northern limestone belt, within the middle calcium- limestone member of the Quatsino Formation. The limestone is warped into a small southwest-plunging syncline with a west limb striking 015° and dipping 15° northwest and an east limb dipping less than 10° south. Two porphyritic dikes striking northeast and dipping vertically are exposed in the west quarry.

The limestone is fine grained, dark grey to black with some light grey bands. Calcium limestone is predominant, with minor interbedded magnesian limestone. The analysis of a chip sample across 11.6 metres of strata in the southwest face of the west quarry is given in Table 6.

Two small quarries were operated by Stanley Beale between 1945 and 1955. Holnam West Materials (Ideal Cement Company) acquired the property in 1956.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Mathews, W.H. (1947): Calcareous Deposits of the Georgia Strait Area; Bulletin 23, pages 85-86.

Mathews, W.H. and McCammon, J.W. (1957): Calcareous Deposits of Southwestern British Columbia; Bulletin 40, pages 77-78.

NORTHERN VANCOUVER ISLAND

Jeune Landing
(Neroutsos Inlet) NTS: 92L/5, 6, 11, 12
MINFILE No.: 92L 151 Latitude: 50°27'33"
Map No.: L021 Longitude: 127°31'08"

A broad limestone band stretches from Rupert Inlet south-southeast for 15 kilometres along the east side of Neroutsos Inlet (southeast arm of Quatsino Sound). This band is a fault-bounded segment of the Quatsino-Tlupana limestone belt situated near the north end of the belt. The band narrows southeastward from a maximum width of 8 kilometres at Rupert Inlet to 5 kilometres in the vicinity of Jeune Landing to the south. Its great width is probably due to the repetition of beds by northwest-trending faults. A northeast-trending strike-slip fault offsets the band from the main limestone belt to the southeast. Underlying basaltic flows of the Karmutsen Formation outcrop along the east side of the band. A narrow southeast-trending wedge of argillite and black limestone of the Parsons Bay Formation is infaulted along the centre of the band in its southern half. Bedding generally strikes north-northwest and dips 20° to 40° southwest. Just north of a quarry on Lot 1582 the limestone strikes 153° and dips 40° southwest.

Light grey limestone, often brecciated, is exposed near Marble River along Rupert Inlet. Thin chert beds are locally present. The limestone here is reported to be magnesian in places. Farther south, near Jeune Landing, the band is generally composed of fine-grained, light to dark grey limestone with a few black beds. White to dove-grey high-calcium limestone containing beds of pure dolomite is exposed nearby. A sample across a dolomite bed 2.4 metre thick assayed 19.00 per cent MgO (Goudge, 1944, p. 138, Sample 3). Five chip samples taken along various road-cuts in the vicinity of Jeune Landing over lengths of 36.6 to 195 metres returned the following range in compositions (in per cent) (McCammon 1968 p. 318, Samples 7, 8, 10, 11, 12): CaO, 53.08-54.12; MgO, 0.79-1.89; insolubles, 0.59-1.25; R_2O_3, 0.18-0.33; Fe_2O_3, 0.04-0.17; MnO, 0.005-0.016; P_2O_5, 0.01; sulphur, <0.01-0.02; ignition loss, 43.55-43.87.

This limestone has been quarried at two locations on the east side of Neroutsos Inlet for use in the Port Alice pulp mill to the south. A quarry on Lot 1581, 0.9 kilometre northwest of Jeune Landing was in operation between 1919 and 1925. A second quarry was opened in 1925 on Lot 1582, 2.5 kilometres northwest of Jeune Landing and was operated continuously up to 1960. Production between 1919 and 1960 totalled 308 520 tonnes.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Anonymous: Report on Limestone Deposits of the Pacific Northwest; undated, unpublished report in Industrial Mineral File, page 1.

McCammon, J.W. (1968): Limestone Deposits at the North End of Vancouver Island; Minister of Mines Report, pages 312-314, 318.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 137-138.

Benson Lake
(Iron Lake, Merry Widow) NTS: 92L/06W
MINFILE No.: 92L 295,
092L 044 Latitude: 50°23'00"
Map No.: L022 Longitude: 127°15'07"

Limestone is quarried by the International Marble and Stone Company Ltd. 3 kilometres southwest of Benson Lake, 26 kilometres south-southwest of Port McNeill in the Quatsino-Tlupana limestone belt. At the quarry the limestone strikes 120° and dips 30° northeast.

The quarried limestone is massive, fine grained and white in colour, with a brightness of 95.5 per cent (Hora, 1986, p. 239). One third of the exposed limestone is extensively fractured. The average analysis of a series of randomly collected samples from the quarry is given in Table 7.

Several kilometres to the southeast, in the vicinity of Iron and Truite lakes, the limestone is generally light grey and fine grained, although black limestone that is highly fractured and veined with white calcite outcrops on the northern tip of Truite Lake. Analytical results from a series of chips collected along 152 metres of roadcut on

TABLE 7
ANALYSES OF QUATSINO LIMESTONE, NORTHVERN VANCOUVER ISLAND

Deposit	Map No.	ID	CaO %	MgO %	SiO_2 %	Al_2O_3 %	Insol. %	R_2O_3 %	Fe_2O_3 %	MnO %	P_2O_5 %	S %	LOI %	H_2O %
Benson Lake	L022	1	55.1	2.49	0.27	0.05			<0.09	<0.003			43.97	
		2	54.60	0.58			1.10	0.31	0.12	0.013	0.01	0.110	43.62	0.25
Merry Widow	L022	3	54.57	0.10	0.14		2.22							
		4	52.89	2.32	0.02		0.60							
		5	53.67	1.81	0.15	0.06			0.06	0.02	0.01		43.84	
Bonanza Lake East	L023	6	53.5	0.38			2.05	0.58						
		7	55.08	0.11			1.02	0.33	0.055	0.008	0.02		43.55	0.07
		8	55.10	0.10			0.96	0.49	0.06	0.010	0.03	0.07	43.54	0.13
		9	55.06	0.12			1.08	0.16	0.05	0.006	0.01	0.01	43.56	0.01
Bonanza Lake W.	L024	10	54.65	0.22			1.88	0.35	0.09	0.006	0.03	0.02	42.94	0.09
Tsulton Claims	L025	11	55.27	0.04			0.95	0.45	0.06	0.009	0.03	<0.01	43.39	0.11
Fox Claims	L026	12	54.33	1.19	0.51	0.20			0.14		0.011	0.01	43.40	
Beaver Cove	L027	13	55.17	0.08			1.22	0.30	0.13	0.023	0.02	0.01	43.21	0.05
		14	54.34	0.34	1.04	0.12			0.16			0.02		
Port McNeill	L028	15	53.64	0.22			3.10	0.33	0.17	0.015	0.02		42.49	0.20
		16	55.26	0.08			0.92	0.12	0.06	0.003	0.03	0.01	43.43	0.11
Central Zeballos Mine	D001	17	36.2	17.0			0.93	0.28						
		18	47.3	7.26			1.8	0.25						
		19	49.3*	4.5*			2.6							
		20	34.7*	17.9*			0.78							
		21	34.3*	18.4*										
		22	52.1*	0.84										0.13
Hankin Point	L029	23	54.09	1.21			0.53	0.40	0.09	0.018	0.01	0.01	43.81	0.06
		24	54.26	1.01			0.60	0.42	0.06	0.019	0.02	<0.01	43.77	0.05
Nootka Marble	L030	25	54.18	0.78		0.028	0.68		0.095			0.013		
Kains Lake	L031	26	54.29	0.04			1.64	0.17	0.14	0.060	0.02	0.03	43.40	0.07

Notes

1. *Average of a series of randomly collected chips. Average TiO_2 is less than 0.01% (Hora, 1986).*
2. *Chips collected at intervals of 6.1 m along 152 m of roadcut on the south shore of Iron Lake (McCammon, 1968, p. 318, Sample 16).*
3. *Grab samples from Merry Widow - Empire property. Brightness: blue light 92.2%, green light 91.8% (J.M. Huber Corp., 1990).*
4. *Grab sample from Merry Widow - Empire property Brightness: blue light 93.6%, green light 93.8% (J.M. Huber Corp., 1990).*
5. *Grab sample from Merry Widow - Empire property (Cominco Ltd., 1990).*
6. *Average of four samples of powdered limestone from percussion-drill holes in the lower limestone member on the Doro claim. Average brightness is 86.5% (Gunning, 1981, p. 4).*
7. *Average of two chip samples taken in succession along 305 m of roadcut east of the north end of Bonanza Lake (McCammon, 1968, p. 318, Samples 30 and 31).*
8. *Grab sample from Leo D'Or mineral claim (Read, 1988).*
9. *Grab sample from Leo D'Or mineral claim (Read, 1988).*
10. *Chip sample at 3 m intervals across 61 m of black and white limestone west of the north end of Bonanza Lake (McCammon, 1968, p. 318, Sample 28).*
11. *Chips collected at intervals of 1.5 m along 48 m of cut starting 180 m north of Mile 6 on the Nimpkish Valley logging railway (McCammon, 1968, p. 318, Sample 27).*
12. *Composite grab sample (Haslam, 1975a, p. 17).*
13. *Chip sample across 67 m of white sugary limestone at north end of belt (McCammon, 1968, p. 318, Sample 22).*
14. *Grab(?) sample of white limestone from south end of belt (Goudge, 1944, p. 142, Sample 8).*
15. *Chips collected at intervals of 30 cm across 18 m of quarry face (McCammon, 1968, p. 318, Sample 21).*
16. *Randomly collected chips from quarry floor (McCammon, 1968, p. 318, Sample 18).*
17. *Average of samples of white carbonate from the 900 crosscut, 57.9 to 85.3 from the portal (Stevenson, 1950, p. 47).*
18. *Average of samples of grey limestone from 900 crosscut, 182.9 to 201.2 m from the portal (Stevenson, 1950, p. 48).*
19. *Grab sample collected by Impact Resources Inc. Brightness: blue light 90.4, green light 91.25 (Kent, 1989).*
20. *Grab sample collected by Impact Resources Inc. Brightness: blue light 90.8, green light 92.1 (Kent, 1989).*
21. *Grab sample collected by Impact Resources Inc. Brightness: blue light 84.6 (Kent, 1989).*
22. *Grab sample collected by Impact Resources Inc. Brightness: unspecified light 89.6 (Kent, 1989).*
23. *Chip sample across 122 m at east end of Hankin Inlet limestone band (McCammon, 1968, p. 318, Sample 4).*
24. *Chip sample across 91 m at west end of Hankin Inlet limestone band (McCammon, 1968, p. 318, Sample 3).*
25. *Average of two samples of limestone (Parks, 1917, pp. 167-168, Sample 1425, 1424).*
26. *Average of four grab samples (McCammon, 1968, page 318, Sample 1).*

* *Values converted from $CaCO_3$*
** *Values converted from $MgCO_3$*

the south shore of Iron Lake are given in Table 7. On the west side of the Benson River the limestone is white to grey. Analyses of three grab (?) samples of this limestone from the Merry Widow - Empire property (MINFILE 092L 044) are also given in Table 7.

International Marble and Stone Company Ltd. has been quarrying limestone at Benson Lake since late 1985. The limestone is shipped to Surrey, British Columbia, where it is processed into a variety of filler-grade products at the company's plant. Production between 1985 and 1987 totalled 26 810 tonnes of limestone. Taywin Resources Ltd., of Vancouver sampled limestone on its Merry Widow - Empire property in 1990 while exploring for precious metal bearing skarn zones.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Cominco Ltd. (1990): Exploration research lab, private XRF analysis report for International Marble and Stone Ltd. and Taywin Resources Ltd., 1 page, in Industrial Mineral File.

Hora, Z.D. (1986): New Developments in Industrial Minerals; in Geological Fieldwork 1985, Paper 1986-1, page 239.

Jeffery W.G. (1960): Benson Lake, Minister of Mines Report, pages 92-93

J.M. Huber Corporation (1990): Calcium carbonate division - laboratory data systems, private analytical report for Taywin Resources Ltd., 2 pages, in Industrial Mineral File.

McCammon, J.W. (1968): Limestone Deposits at the North End of Vancouver Island; Minister of Mines Report, pages 312, 315, 318.

Bonanza Lake East
(Doro, Bonanza, Leo d'Or)

NTS: 92L/07W
MINFILE Nos.: 92L 109, 92L 339
Latitude: 50°24'52"
Map No.: L023
Longitude: 126°48'20"

A band of limestone up to 2.5 kilometres wide trends northward along the east side of Bonanza River and Bonanza Lake for 8 kilometres. To the west the limestone is in fault contact with basaltic flows of the Karmutsen Formation. An elongate stock of coarse-grained, biotite quartz monzonite of the Island plutonic suite intrudes the limestone from the southeast. On the Doro claim, 1 kilometre north of Bonanza Lake, the strata strike north and dip 25° east. Farther north bedding strikes northwest and dips moderately southwest. A west-trending fault just north of the Doro claim separates the northern and southern segments of the deposit into two fault blocks that have rotated with respect to each other.

The majority of the deposit on the Bonanza 1, 2 and Doro mineral claims (MINFILE No. 92L 109) is comprised of upper, medium to dark grey limestone and lower, light grey to white limestone members. The upper member is occasionally contaminated with chert nodules and minor tremolite. The lower member is fine to coarse-grained and stylolitic. Thin beds and lenses of dark grey pyritic chert are present within the limestone near the south end of the deposit. The chert nodules and pyritic chert lenses become more numerous near the basalt contact and quartz monzonite stock. Numerous aplite, diorite and amphibolite sills and dikes have intruded the limestone on the Doro claim. The average analysis of four samples of powdered limestone from a series of percussion drill holes in the lower member on the Doro claim and two chip samples taken in succession along 305 metres of roadcut just east of the north end of Bonanza Lake are given in Table 7. The Doro claim is estimated to contain 27 million tonnes of limestone in a 16.7 hectare area on a steep hillside that rises 30° to 35° eastward to 210 metres above the west side of the property (Gunning, 1981, p. 5).

At the extreme south end of the band on the Leo D'Or mineral claim (MINFILE No. 92L 339), white to black limestone outcrops on the slope along the northeastern shore of Bonanza Lake 0 to 400 metres above its surface. Outcrops are uniformly coloured to banded in shades ranging from very light grey to black and less commonly mottled grey and white. Grain size varies from fine to coarse, with medium grained material predominating. Coarser material is usually light grey, while the finer stone is commonly dark grey. The limestone is intruded by a few discontinuous basaltic dikes and sills 30 centimetres to several metres wide. Eleven samples of light grey weathering, white to medium grey limestone contained greater than 99 per cent calcite, 0.5 per cent quartz plus other silicates and less than 0.5 per cent opaque minerals (Read, 1988, page 3). Chemical analyses for two grab samples are given in Table 7. A 100 by 160 metre area of very light grey to white massive marble situated on a 30° slope 1 kilometre southeast of the northern tip of Bonanza Lake is estimated to contain reserves of 660 000 tonnes (Broughton and Bruce, 1988, pages 7 and 8).

The deposit on the Doro claim was first tested for its dimension stone potential sometime before 1982. The International Marble and Stone Company drilled the deposit in 1982 and drove a 65-metre adit in 1983. Development work was discontinued after encountering grey limestone contaminated by dikes. Bonanza Marble Quarry Ltd. proposed opening a small quarry on the east side of Bonanza Lake at its north end in 1989. The company planned to quarry 10 to 15 tonnes of white limestone a day for the manufacture of tiles and other marble products. The south end of the band was geologically

mapped and sampled for its marble potential by Havilah Gold Mines Ltd. in 1987 and White Marble Mountain Corporation in 1988. Some mapping and diamond drilling was carried out by Industrial Fillers Ltd. over the rest of the deposit in 1988, to assess the potential for producing white limestone.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Broughton, S.E. and Bruce, I.E. (1988): Summary of Field Work and Preliminary Evaluation - Bonanza Lake Marble Property; Klohn Leonoff Ltd., private report for White Marble Mountain Corporation in Industrial Mineral File.

Coffin, D. and Soux, C. (1988): Diamond Drilling Report on the Bonanza Property; Assessment Report 17760.

Devlin, J. and Rychter, A. (1987): A Prospecting Report on the Leo d'Or Mineral Claim; Assessment Report 16111.

Dyer, G.G. (1989): Proposed Marble Quarry - Northeast Corner of Bonanza Lake; Hardy BBT Ltd., private report for Bonanza Marble Quarry Ltd. in Industrial Mineral File.

Gunning, D. (1981): Geochemical and Diamond Drilling Report on the Doro Claim; Assessment Report 10193.

Hora, Z.D. (1986): New Developments in Industrial Minerals; in Geological Fieldwork 1985, Paper 1986-1, pages 239-240.

McCammon, J.W. (1968): Limestone Deposits of the North End of Vancouver Island; Minister of Mines Report, pages 312, 317, 318.

Read, P.B. (1988): Petrographic Analysis of Marbles, Leo D'Or Marble Claims, Bonanza Lake, Vancouver Island; Geotex Consultants Ltd., private report for White Marble Mountain Corporation in Industrial Mineral File.

Bonanza Lake West NTS: 92L/07W
MINFILE No.: 92L 280 Latitude: 50°24'04"
Map No.: L024 Longitude: 126°48'51"

A band of limestone 24 kilometres long extends northward along the west side of Bonanza River and Bonanza Lake to the Tsulton River, where it is truncated by a northeast-trending fault. This band comprises the southern two-thirds of the Bonanza limestone belt. The formation strikes north-northwest and dips gently to the west. The limestone is 300 metres thick in the vicinity of Bonanza Lake.

The lower part of the unit consists of white and grey, fine-grained limestone. In the middle the deposit is darker in colour and dolomitic in some beds. The upper part comprises black limestone with scattered lenses of black chert 5 to 15 centimetres thick. Analytical results on a composite sample of chips taken at 3-metre intervals across mixed layers of black and white limestone just west of the north end of Bonanza Lake are given in Table 7.

Industrial Fillers Ltd. staked a part of the deposit in 1989.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1968): Limestone Deposits of the North End of Vancouver Island; Minister of Mines Report, pages 312, 318.

Tsulton Claims (Nimpkish Lake) NTS: 92L/07W
MINFILE No.: 92L 186 Latitude: 50°25'10"
Map No.: L025 Longitude: 126°57'16"

A band of limestone up to 4.5 kilometres wide trends south-southeast from the north end of Nimpkish Lake for 15 kilometres. This carbonate mass comprises the northern half of the Nimpkish limestone belt. The band is bounded to the east by overlying black argillite and limestone of the Parsons Bay Formation. To the west the it is conformably underlain by or faulted against basaltic flows of the Karmutsen Formation. A northwest-trending mass of coarse-grained biotite quartz monzonite of the Island plutonic suite intrudes the limestone band at its south end.

Mapping and diamond drilling along the east side of Nimpkish Lake, 7.5 to 12.5 kilometres south of its north end, show the limestone is comprised of an upper medium to dark grey member with off-white to light grey interbeds, and a lower white to light grey, generally fine-grained member containing some dark grey and cherty beds. The two members appear to be folded into a broad north-trending syncline. Pyritic chert lenses become common southwards toward the monzonite intrusion and near the basalt contact. A few thin sills and dikes of fine-grained diabase and silicified and pyritized andesite intrude the limestone.

Various exposures of fine-grained, massive, black limestone occur along the Tsulton River, 4 kilometres north of the area mapped in detail. Analytical results on a sample composed of chips taken at 1.5-metre intervals for 48 metres along a cut starting 180 metres north of the 6-Mile post of the Nimpkish Valley logging railway are in Table 7.

Industrial Fillers Ltd. staked a large portion of the limestone band in 1987. Mapping and diamond drilling

were conducted in 1988 to assess the deposit for its light-coloured stone.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Coffin, D. and Soux, C. (1988): Diamond Drilling Report on the Tsulton Property; Assessment Report 17759.

McCammon, J.W. (1968): Limestone Deposits of the North End of Vancouver Island; Minister of Mines Report, pages 312, 317-318.

Fox Claims (Holberg Inlet) NTS: 92L/12W
MINFILE No.: 92L 267 Latitude: 50°37'13"
Map No.: L026 Longitude: 127°56'03"

This deposit is situated 6 kilometres east of the head of Holberg Inlet on its south shore, 34 kilometres southwest of Port Hardy, at the north end of the Quatsino-Tlupana belt.

Three masses of limestone are exposed in a rectangular fault- block 2 kilometres wide that extends southeastward from the shore of Holberg Inlet for 2.5 kilometres. The western-most deposit outcrops over an area of 1.8 by 1.3 kilometres. The limestone is underlain by chloritic, amygdaloidal basalt of the Karmutsen Formation. Variably amygdaloidal Lower Jurassic Bonanza Group (?) volcanics outcrop around the east, west and south sides of the deposit. It is comprised of fine-grained, white to dark grey limestone, commonly cut by calcite veinlets. Minor sulphides are present. The limestone is intercalated with tuff, basalt and vesicular andesite in a few places. An analysis of a composite grab sample is given in Table 7. Reserves in the western deposit are estimated at 236 million tonnes of clean limestone over 190 hectares, with a minimum thickness of 46 metres (Haslam, 1975b, p. 16).

World Cement Industries Inc. completed 1529 metres of diamond drilling, together with some mapping and sampling, between 1971 and 1980, to assess the limestone as potential feedstock for a cement plant that it proposed to build at Nanaimo. The company projected annual production of 900 000 tonnes of cement for the export market.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Haslam, H. (1975a): Geological Report on the Fox Property; Assessment Report 5413.

Haslam, H. (1975b): Progress Report on the Limestone Deposits at Holberg Inlet, Vancouver Island; Assessment Report 5666.

Haslam, H. (1976): Drilling Report on the Fox Property; Assessment Report 6053.

Weymark, W. (1974): Drilling Assessment Report Fox 1-20 Mineral Claims, Holberg Inlet, Vancouver Island; Assessment Report 4908.

Weymark, W. (1978): Diamond Drilling Report on the Fox Property; Assessment Report 6951.

Weymark, W. (1980): Drilling Report on the Fox and Joy Claims; Assessment Report 8073.

Beaver Cove (Tsulton River) NTS: 92L/10W
MINFILE No.: 92L 279 Latitude: 50°31'00"
Map No.: L027 Longitude: 126°53'30"

A band of limestone extends southward along the east side of a hill just west of Beaver Cove for 2500 metres to the Tsulton River. This deposit lies near the north end of the Bonanza limestone belt. The band is bounded to the west by an elongate, north-trending diorite stock. Underlying basalts of the Karmutsen Formation outcrop to the east. The strata strike northwest and dip steeply southwest. The limestone unit varies from 120 to 150 metres thick.

Near its north end the band is comprised mostly of fine-grained, white to black streaked limestone that becomes coarse grained near the diorite contact where some pyrrhotite-garnet-epidote skarn is developed. The limestone contains some chert and a few narrow dikes. To the south, exposures in the Tsulton River are creamy white, sugary limestone interbedded with a few bands of fine-grained, bluish grey limestone. Occasional small nodules of chert and a few thin dikes are present here also. Analytical results on a chip sample taken across 67 metres of white sugary textured limestone on the north end of the band and a sample of white limestone from the south end are given in Table 7.

It is reported that some marble was quarried from the south end of this deposit around 1884, on the Tsulton River 2.8 kilometres southwest of Beaver Cove .

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Anonymous: Report on Limestone Deposits of the Pacific Northwest; undated, unpublished report in Industrial Mineral File, page 2.

McCammon, J.W. (1968): Limestone Deposits of the North End of Vancouver Island; Minister of Mines Report, pages 316, 318.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, page 136.

Parks, W.A. (1917): Report on the Building and Ornamental Stones of Canada; Report 452, Volume 5, pages 171-172.

Port McNeill (Eric Claim) NTS: 92L/11E
MINFILE No.: 92L 282 Latitude: 50°33'25"
Map No.: L028 Longitude: 127°03'40"

This occurrence outcrops about 4 kilometres southeast of Port McNeill on a northward-flowing tributary of Hyde Creek. A mass of limestone is exposed as a west-trending lens shaped ridge at least 1.6 kilometres long and 800 metres wide on both sides of the creek. To the east the limestone rests on underlying amygdaloidal and porphyritic basaltic lavas of the Karmutsen Formation. To the south it is in fault contact with these volcanics. Bedding in western outcrops strikes 051° to 055° and dips 47° to 60° northwest. Drilling in 1980 showed the limestone is at least 60 metres thick.

The deposit consists mostly of well-jointed, fine-grained, light grey to white banded limestone with occasional dark patches and bands. The darker material is more common in the eastern part of the deposit. Exposed surfaces display silicious fossil (?) remains weathering out of the limestone. The limestone is pyritic in a few instances. In thin section the rock displays sparsely scattered quartz grains in fine-grained calcite. Quarry exposures just west of the creek show the limestone is intruded by several andesitic dikes 0.3 to 1.5 metres wide and a mass of serpentinite 23 metres in diameter. Analytical results on a sample comprised of chips taken at 30-centimetre intervals across 18 metres of quarry face and a grab sample of randomly collected chips from the quarry floor are in Table 7. A 6-hectare block encompassing the quarry was estimated to contain 5.4 million tonnes of limestone to a depth of 18 metres below the quarry floor (Gunning, 1981, p. 6).

The deposit was quarried by Lamac Construction Ltd. during 1967 and 1968 to produce riprap for a breakwater at Port McNeill. The rock broke into pieces too small for this use, because of the extensive jointing, bringing the operation to an eventual halt. International Marble and Stone Company carried out 499 metres of diamond drilling and some geological mapping in 1980 and 1981. The company was unsuccessful in outlining reserves of filler-grade limestone. Industrial Fillers Ltd. staked the deposit in 1987 and geologically mapped its northeastern extension in 1988.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Anonymous: Report on Limestone Deposits of the Pacific Northwest; undated, unpublished report in Industrial Mineral File, pages 4-5.

Coffin, D. and Soux, C. (1988): Geological Report on the Eric Property; Assessment Report 17761.

Gunning, D. (1980): Diamond Drilling Report on the Ima Property; Assessment Report 8082.

Gunning, D. (1981): Geochemical and Diamond Drilling Report on the Doro Claim; Assessment Report 10193.

McCammon, J.W. (1968): Limestone Deposits of the North End of Vancouver Island; Minister of Mines Report, pages 312, 316, 318.

Zeballos
(Central Zeballos Mine) NTS: 92L/02W
MINFILE No.: 92L 214 Latitude: 50°02'30"
Map No.: D001 Longitude: 126°47'10"

Limestone and dolomite are exposed in the 900 crosscut of the Central Zeballos mine, 7 kilometres northeast of the community of Zeballos, 110 kilometres due west of the town of Campbell River.

The 900 crosscut was driven near the west end of a mass of medium to coarse-grained, recrystallized limestone that extends westward from the Nomash River for 2000 metres along the northern margin of a granodiorite stock. The deposit lies within the Quatsino-Tlupana limestone belt, near its southern end. The crosscut exposes grey calcium limestone intermingled with white dolomite and magnesian limestone along its 314 metre length. Most of the white carbonate is confined to a zone between 45 and 120 metres from the portal. Microscopic studies indicate that it is comprised mostly of dolomite with a little interstitial calcite. The dolomite and magnesian limestone occur as white streaks, commonly ranging from a few centimetres to 10 metres thick, with one streak attaining a thickness of 21 metres. These streaks are probably the result of metasomatic activity associated with the emplacement of nearby intrusions. Five angled drill holes varying from 12.2 to 38.7 metres in length near the portal of the 900 crosscut intersected medium to fine-grained, grey to white dolomite containing scattered chloritic inclusions, comprising from less than 5 per cent up to 30 per cent of the rock, and minor pyrite as scattered blebs and fine grains. The dolomite sometimes has a slight bluish cast. A few narrow, chloritized andesitic dikes were also intersected.

Analysis of samples taken in the crosscut and various grab samples collected by Impact Resources Inc. are given in Table 7.

The deposit was sampled in 1981 and 1982 by Impact Resources Inc. The company carried out 128.4 metres of drilling in five holes in 1982. Dolomite reserves are estimated at several million tonnes (Kent, 1989).

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Kent, R.F. (1989): letter with assays by Calcium Carbonate Company (1981) and Econotech Services Ltd. (1981, 1982); in Industrial Mineral File.

Stevenson, J.S. (1950): Geology and Mineral Deposits of the Zeballos Mining Camp; Bulletin 27, pages 16-18, 47-48.

Tully, D.W. (1990): letter with diamond-drill core logs; in Industrial Mineral File.

Hankin Point
(Quatsino Sound) NTS: 92L/12E
MINFILE No.: 92L 285 Latitude: 50°35'08"
Map No.: L029 Longitude: 127°33'06"

A band of limestone 300 metres wide extends westward from Rupert Inlet to Holberg Inlet for 2.5 kilometres, just north of Hankin Point, 16 kilometres south-southwest of Port Hardy. The limestone dips northward. It is comprised of light to dark grey limestone with numerous irregular masses and lenses of chert, especially along the northern margin. A few dikes intrude the limestone. Analyses of two chip samples taken at the east and west ends of the band are given in Table 7.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1968): Limestone Deposits of the North End of Vancouver Island; Minister of Mines Report, pages 312-313, 318.

Nootka Marble
(Hisnet Inlet) NTS: 92E/10E, 15E
MINFILE No.: 92E 020 Latitude: 49°45'00"
Map No.: L030 Longitude: 126°30'30"

A deposit or recrystallized limestone at the head of Hisnet Inlet, a northwestward extension of Tlupana Inlet, was quarried for marble by Nootka Quarries Ltd. in 1908 and 1909. This occurrence is situated at the southeast end of the Quatsino-Tlupana limestone belt where the limestone is more than 300 metres thick. Bedding strikes 060° to 080°. A granodiorite stock 3.5 kilometres wide intrudes the limestone a kilometre southeast of the quarry site.

The deposit is comprised of medium to coarse-grained, white to light grey limestone (marble), occasionally containing some dolomitic bands. At the quarry site it is intruded by basaltic dikes that comprise up to 55 per cent of the rock volume. The average analysis of two samples of limestone from the quarry reported by Parks (1917) is given in Table 7.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Brewer, W.M. (1916): Marble on Vancouver Island; Minister of Mines Report, pages 359-360.

Carmichael, H. (1906): Nootka Sound Marble Quarry: Minister of Mines Report, pages 184-185.

Rayson, H.C. (1908): Nootka Marble Quarry: Minister of Mines Report, page 144.

White, G.V. (1987): Dimension Stone Quarries in British Columbia; in Geological Fieldwork 1986, Paper 1987-1, pages 329-332.

White, G.V. and Hora, Z.D. (1988): British Columbia Dimension Stone; Information Circular 1988-6, page 23.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 138-140.

Parks, W.A. (1917): Report on the Building and Ornamental Stones of Canada; Report 452, Volume 5, pages 163-171.

Kains Lake NTS: 92L/12E
MINFILE No.: 92L 287 Latitude: 50°41'59"
Map No.: L031 Longitude: 127°39'56"

A band of limestone 250 to 350 metres wide stretches for 5 kilometres east-southeast from Kains Lake, approximately 11 kilometres west of Port Hardy. The unit appears to be dipping to the southwest. The average analysis of four grab samples is given in Table 7.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1968): Limestone Deposits of the North End of Vancouver Island; Minister of Mines Report, pages 312, 318.

TABLE 8
ANALYSES OF QUATSINO LIMESTONE, CENTRAL SOUTHERN VANCOUVER ISLAND AND QUADRA ISLAND

Deposit	Map No.	ID	CaO %	MgO %	SiO_2 %	Al_2O_3 %	Insol. %	R_2O_3 %	Fe_2O_3 %	MnO %	P_2O_5 %	S %	LOI %	H_2O %
Spencer Creek	L032	1	55.48	0.32			0.40	0.16	0.09	0.08	0.03	0.01	43.74	0.09
		2	55.66	0.16			0.46	0.17	0.10	0.007	0.02	<0.01	43.80	0.03
		3	54.91	0.44	0.53	0.24*						0.11*	43.45	
		4	55.29	0.82	0.29	0.098			0.12				43.65	
Kennedy Lake E.	L033	5	54.80	0.74			0.84	0.17	0.11	0.008	trace	0.002	43.37	0.05
Bamberton	L034	6	53.88	0.86			1.92	0.17	0.34	0.019	0.023	0.051	42.78	
		7	24.9	0.39			52.5							
Effingham Inlet	L035	8	53.37	1.28	1.54	0.18			0.19				43.49	
Harris Creek	L036	9	54.54	1.00			0.39	0.16	0.07	<0.01	0.02	0.004	43.65	0.05
Gordon River	L037	10	54.72	0.21			1.30	0.24	0.17	0.02	0.02	0.068	43.22	0.02
Nixon Creek	L038	11	54.52	0.23			1.65	0.34	0.21	0.03	0.04	0.024	43.37	0.03
Kennedy Lake W.	L039	12	54.98	0.49			0.70	0.22	0.14	0.012	trace	0.001	43.46	0.08
Tod Inlet	L040	13	54.6**	trace	1.1				0.8					
		14	54.07	0.58	1.42	0.21			0.31			0.02		
Open Bay	L042	15	54.04	0.32			1.66	0.16	0.14	0.018	0.041	0.06	43.27	0.01

Notes

1. *Average of three chip samples taken in succession across 290 m of limestone at the north end of the deposit (McCammon, 1968, p. 319, Samples 1-3).*
2. *Chip sample across 160 m of limestone taken 930 m southeast of previous sample (McCammon, 1968, p. 319, Sample 4).*
3. *Average of 776.5 m of core from 11 holes drilled on a NE-trending section 520 m long (Ashgrove Cement Company, 1970).*
4. *Average of 399 samples taken on a grid with 60 m line spacing covering an area of 32.5 ha near the north end of the deposit. Twenty-five samples containing less t than 51% CaO were omitted from the calculation of average CaO content; 46 samples contained greater than 0.50% MgO and greater than 0.50% SiO_2 (Gilbert Mines Canada Ltd., 1969; Ashgrove Cement Company, 1970).*
5. *Composite of chips taken at 3 m intervals along 91 m of road-cut on Highway 4, 400 m west of the turn-off for Maggie Lake (McCammon, 1962, p. 153, Sample 3).*
6. *Average of five chip samples taken in succession across the face of the lower main quarry in 1946 (Mathews, 1947, p. 95, Samples 4, 6-9).*
7. *Sample of pale green "rhyolite", "difficult to distinguish from the limestone" (Mathews, 1947, p. 95, Sample 5).*
8. *Average of 26 samples taken on a NW line across the deposit (Anonymous).*
9. *Composite of chips taken at 6 m intervals along 150 m outcrop on a logging road 370 m above and 1.5 km west of the Menachie Lake - Port Renfrew road (McCammon, 1966, p. 270, Sample 3).*
10. *Chips taken at random along a 60 m road-cut adjacent to the Gordon River, 500 m southwest of Hauk Creek (McCammon, 1966, p. 270, Sample 6).*
11. *Composite of chips taken at 3 m intervals along a 60 m cut on logging road C-18, 1.6 km west of Nixon Creek (McCammon, 1966, p. 270, Sample 5).*
12. *Chips taken at random from an outcrop on the northwest corner of the deposit (McCammon, 1962, p. 153, Sample 2).*
13. *Composite sample of purer limestone from Nos. 2 and 3 quarries (Clapp, 1912, p. 62).*
14. *Chip sample across 15 m at north end of No. 3 quarry (Goudge, 1944, p. 142, Sample 5).*
15. *Intensely folded limestone on the east side of the deposit (Mathews and McCammon, 1957, p. 84).*

**Value under Al_2O_3 is $(Al,Fe)_2O_3$; value under S is SO_3.*
***Value converted from $CaCO_3$.*

CENTRAL AND SOUTHERN VANCOUVER ISLAND

Spencer Creek

NTS: 92C/15W
MINFILE No.: 92C 084 Latitude: 48°57'58"
Map No.: L032 Longitude: 124°51'10"

This deposit is located on Spencer Creek, 1.5 to 5 kilometres southeast of Alberni Inlet, 33 kilometres south of Port Alberni. A fault-bounded limestone mass, averaging 600 metres in width, trends northwest for 3.5 kilometres. Eleven holes drilled to depths of up to 102 metres near the north end of the deposit cored continuous limestone. In the central part of the mass the limestone strikes 105° and dips 25° northeast. Two small fault-bounded blocks of volcanic rock lie within the deposit to the southeast. The limestone is cut by a few discontinuous andesitic dikes varying from 1.2 to 12 metres thick. Most strike northwest and dip vertically, although a few of the narrower ones strike northeast.

The deposit consists of fine-grained, dark grey limestone containing numerous white calcite veinlets. Dolomite occurs as irregular brownish patches and as bands up to 30 centimetres thick.

Small irregular lenses of black chert are present in the limestone to the south. Sampling results are summarized in Table 8.

This deposit was explored by Gilbert Mines Canada Ltd. in 1969. Eleven holes were drilled for a total depth of 900.4 metres and 408 grab samples (399 limestone samples and 9 chert samples) were taken along a grid for rock geochemistry.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Ashgrove Cement Company (1970): Assays of Petrogeochemical Samples and Diamond-drill Core; in Industrial Mineral File.

Gilbert Mines Canada Ltd. (1969): Maps of Petrogeochemical Grid and Drill Hole Locations; in Industrial Mineral File.

McCammon, J.W. (1968): Spencer Creek Limestone, Minister of Mines Report, pages 318-320.

Geological Survey of Canada:

Sutherland Brown, A. Yorath, C.J., Anderson, R.G. and Dom, K. (1986): Geological Maps of Southern Vancouver Island, LITHOPROBE 1; Open File 1272, Sheet 8.

Kennedy Lake - East Side NTS: 92F/03W, 04E
MINFILE No.: 92F 190 Latitude: 49°03'46"
Map No.: L033 Longitude: 125°28'53"

This occurrence, 54 kilometres southwest of Port Alberni, is comprised of an irregular belt of calcareous rocks extending northeastwards from the south slope of Salmonberry Mountain along the southeast shore of Kennedy Lake for 9 kilometres. These sediments consist of a lower limestone member at least 600 metres thick, overlain by 240 metres of calcareous tuff which is in turn overlain by 110 metres of limestone. Dips vary from 40° to 60° southeast in the northeast and gradually flatten out along the belt to the southwest. The southwestern third of the belt is folded into a northeastward-trending syncline that preserves the calcareous tuff and upper limestone member and an overlying sequence of Bonanza Group tuffs, breccias and flows. The syncline is terminated to the southwest by a fault and partially truncated to the northeast by a pluton of granodiorite and quartz monzonite of the Jurassic Island plutonic suite. This intrusion flanks the limestone along the northeastern two-thirds of the belt. The limestone is also intruded by a few dikes, sills and small stocks of fine-grained "andesite."

The upper and lower limestone members are composed of dark grey to white, commonly medium grey, medium to coarse-grained limestone that is extensively recrystallized. Some zones of mottled dolomite are present. Plates and nodules of brucite are disseminated in dolomite bands within the upper limestone member where it is cut by the granitic intrusion on the north slope of Salmonberry Mountain. Yellow ankerite (?) grains occur in a few places and sporadic pyrite is also evident. Rounded grains of quartz are occasionally visible in thin section. Analytical results reported by McCammon (1962) are in Table 8.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Eastwood, G.E.P. (1968): Geology of the Kennedy Lake Area; Bulletin 55, pages 19-21.

McCammon, J.W. (1962): Limestone in the Kennedy Lake Area; Minister of Mines Report, pages 151-153.

Bamberton (Elford) NTS: 92B/12E
MINFILE No.: 92B 005 Latitude: 48°35'12"
Map No.: L034 Longitude: 123°31'25"

The Bamberton quarry is located on the west shore of Saanich Inlet, 23 kilometres northwest of Victoria. Limestone was quarried here for lime and cement manufacturing up to 1957.

The Bamberton deposit is comprised of several major limestone lenses within the Cordova-Shawnigan belt. The main lens extends 700 metres northwest from the shore of Saanich inlet and is up to 150 metres thick. Bedding strikes 120° and dips 60° northwest to vertical. The lens is intercalated with tabular greenstone bodies of similar orientation that vary from less than a metre to 15 metres thick. These are basaltic in composition and are probably flows. Faults are commonly exposed in the quarries, generally trending northwest and dipping steeply northeast.

The limestone of the main lens is generally dark bluish grey and fine-grained. Several thin sections reveal small irregular quartz grains, detrital calcite fragments and spherical radiolaria and foraminifera in a very fine limy mud cement containing rare patches of carbonaceous matter.

The lens generally consists of calcium to high-calcium limestone. Bands and irregular masses of magnesian limestone of similar appearance to the high-calcium limestone are exposed to the northeast. One band of magnesian limestone 6 metres thick contains 17 to 40 per cent MgO (Goudge, 1944, p. 132). Sample results reported by Mathews (1947) are in Table 8.

Diamond drilling in a deeply drift covered area northwest of the main lens in 1950 discovered a second northwest-trending, steeply dipping lens of limestone 300 metres long and at least 30 metres wide. The lens is cut by irregular masses of the surrounding greenstone.

Limestone was first quarried at Bamberton by Elford & Company between 1907 and 1911 for lime manufacturing. The Associated Cement Company acquired the property and built a cement plant adjacent to the deposit in 1912. The plant and quarries were shut down in 1916, but were reopened in 1921 by British Columbia Cement Company Limited, an amalgamation of Associated Cement Company (Canada) Ltd. and Vancouver Portland Cement Company. The quarries were then operated continuously to 1957, and the cement plant remained in production up to 1980. A total of 3.7 million tonnes of limestone was quarried between 1913 and 1957 from two quarries in the main lens, the upper main and lower main quarries and a single quarry in the second lens to the

northwest. A.R.M. Industries Ltd. quarried 21 000 tonnes of limestone in 1988 for us as riprap.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Brewer, W.M. (1926): Non-metallics, Cement, Building Stone, Sand and Gravel; Minister of Mines Report, pages 334-337.

King, R.B. and Fyles, J.T. (1950): British Columbia Cement Company Limited; Minister of Mines Report, pages 224-225.

Mathews, W.H. (1947): Calcareous Deposits of the Georgia Strait Area; Bulletin 23, pages 20, 92-96.

Mathews, W.H. and McCammon, J.W. (1957): Calcareous Deposits of Southwestern British Columbia; Bulletin 40, pages 84-88.

Effingham Inlet NTS: 92F/03E
MINFILE No.: 92F 414 Latitude: 49°02'38"
Map No.: L035 Longitude: 125°10'57"

A band of limestone extends 5 kilometres east-northeast from the east end of Pipestem Inlet to the west shore of Effingham Inlet, 35 kilometres southwest of Port Alberni. It widens from 500 metres at Pipestem Inlet to 2000 metres at Effingham Inlet.

At Pipestem Inlet the band is comprised of fine-grained, blue limestone, while at Effingham Inlet to the east it consists of white crystalline limestone cut by numerous dikes. In thin section the limestone at Effingham Inlet displays bands of reddish brown ferruginous mud and unidentified fossil structures cemented by recrystallized calcite and fine limy mud. The average analysis of a series of 26 samples taken across the entire deposit is given in Table 8. The limestone at Effingham Inlet was quarried for marble up to 1902.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Anonymous: Report on Limestone Deposits of the Pacific Northwest; undated, unpublished report in Industrial Mineral File, pages 2-4.

Carmichael, H. (1911): Limestone Deposits of the Coast; Minister of Mines Report, page 208.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, page 141.

Harris Creek NTS: 92C/09E
MINFILE No.: 92C 085 Latitude: 48°41'23"
Map No.: L036 Longitude: 124°14'00"

This deposit is located approximately 17 kilometres southwest of the community of Lake Cowichan in the headwaters of Harris and Lens creeks. A limestone bed is broken up into five major masses by a series of west-northwest-trending faults that are cut by several north-trending strike-slip faults. The individual masses vary up to 3 kilometres in length and 1 kilometre in width. The limestone in individual fault blocks generally strikes west-northwest and dips 20° to 80° north.

The limestones are fine grained and dark grey to black, weathering to a medium to light grey colour. They are generally high-calcium in composition, although a few magnesian limestone beds are present. Siliceous protrusions are sometimes present on weathered surfaces. Analyses reported by McCammon (1966) are given in Table 8.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1966): Limestone, Cowichan Lake - Port Renfrew Area; Minister of Mines Report, pages 269-270.

Gordon River NTS: 92C/16W
MINFILE No.: 92C 086 Latitude: 48°45'51"
Map No.: L037 Longitude: 124°20'31"

This occurrence is located just south of the Gordon River, an active logging camp in the headwaters of the Gordon River, 25 kilometres southwest of the community of Lake Cowichan. A mass of limestone 1 to 1.5 kilometres wide extends 2 kilometres west-northwest from the Gordon River. Underlying Karmutsen volcanics outcrop along the southern margin of the deposit. To the north it is in fault contact with these rocks and with Lower Jurassic Bonanza Group volcanics. Bedding in the limestone dips 25° to 45° north.

The limestone is fine grained, dark grey to black on fresh surfaces, weathering to medium to light grey. With the exception of a few magnesian beds, the rock is high-calcium in composition. Analyses reported by McCammon (1966) are given in Table 8.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1966): Limestone, Cowichan Lake - Port Renfrew Area; Minister of Mines Report, pages 269-270.

Massey, N.W.D., Friday, S.T., Tercier, P.E. and Rublee, V.J. (1987): Geology of the Cowichan Lake Area (92C/16); Open File 1987-2, Sheets 1,7,8.

Geological Survey of Canada:

Sutherland Brown, A. Yorath, C.J., Anderson, R.G. and Dom, K. (1986): Geological Maps of Southern Vancouver Island, LITHOPROBE 1; Open File 1272, Sheet 10.

Nixon Creek NTS: 92C/16W
MINFILE No.: 92C 087 Latitude: 48°50'17"
Map No.: L038 Longitude: 124°28'38"

This occurrence is situated along the west side of Nixon Creek, 30 kilometres west of the community of Lake Cowichan. The deposit is comprised of two limestone units striking northeast for 2.5 kilometres and dipping 5° to 40° northwest. The two limestones are separated by a mafic flow or sill and the sequence is segmented by several west-northwest-trending faults.

Both units are fine-grained, dark grey to black, high-calcium limestone. The analysis of a sample of the upper limestone, reported by McCammon (1966) is given in Table 8.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1966): Limestone, Cowichan Lake - Port Renfrew Area; Minister of Mines Report, pages 269-270.

Massey, N.W.D., Friday, S.T., Tercier, P.E. and Rublee, V.J. (1987): Geology of the Cowichan Lake Area (92C/16); Open File 1987-2, Sheets 1 and 7.

Geological Survey of Canada:

Sutherland Brown, A. Yorath, C.J., Anderson, R.G. and Dom, K. (1986): Geological Maps of Southern Vancouver Island, LITHOPROBE 1; Open File 1272, Sheet 10.

Kennedy Lake - West Side NTS: 92F/04E
MINFILE No.: 92F 191 Latitude: 49°03'17"
Map No.: L039 Longitude: 125°36'24"

A mass of medium-grained, dark grey limestone, outcropping over a 950 by 630 metre area, forms a low isolated hill, 1.7 kilometres west of Kennedy Lake, 60 kilometres west-southwest of Port Alberni. The limestone is underlain by fine-grained argillite or tuff with a contact that dips gently northeast. The limestone is intruded on the east side by small mafic stock. Analytical results reported by McCammon (1962) are given in Table 8.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Eastwood, G.E.P. (1968): Geology of the Kennedy Lake Area; Bulletin 55, page 21.

McCammon, J.W. (1962): Limestone in the Kennedy Lake Area; Minister of Mines Report, pages 151-153.

Tod Inlet (Quarry Lake, Butchart's Gardens) NTS: 92B/11W
MINFILE No.: 92B 006 Latitude: 48°33'58"
Map No.: L040 Longitude: 123°28'19"

The Tod Inlet deposit, now quarried out, was located, just south of Brentwood Bay on the east shore of Saanich Inlet, 18 kilometres northwest of Victoria. Limestone was produced from three quarries for cement manufacturing up to 1921.

The deposit, part of the Cordova-Shawnigan carbonate belt consisted of a series of limestone bodies up to 75 metres wide and 150 metres long arranged in an en echelon pattern within surrounding Triassic greenstones (Karmutsen Formation ?). These bodies probably represent a single northwest-trending limestone bed repeatedly offset by a series of oblique faults. The limestone strikes 150° and dips between 30° southwest and vertical.

These deposits generally consist of fine-grained, black to dark bluish grey to white, high-calcium limestone intruded by mafic dikes. Small masses of magnesian limestone were reported in the Nos. 2 and 3 quarries. A well-developed joint pattern strikes northwest parallel to the formation and dips 70° southwest. The limestone in the No. 3 quarry is extensively fractured and veined with white calcite. Analyses reported by Clapp (1912) and Goudge (1944) are given in Table 8.

The limestone deposits at Tod Inlet were initially exploited for lime manufacturing before 1904. In 1904 the Vancouver Portland Cement Company acquired the property and built a cement plant on the east shore of Tod Inlet. The plant was eventually shut down in June 1921 after Vancouver Portland Cement amalgamated with Associated Cement to form B.C. Cement Co. Ltd., resulting in the transfer of operations to Bamberton. Approximately 915 000 tonnes of limestone were produced from three quarries between 1905 and 1921. The Nos. 1 and 2 quarries, located next to the plant on Tod Inlet, were largely exhausted. They are now the site of the Butchart's Gar-

dens, a major tourist attraction in the Victoria area. The No. 3 quarry (Quarry Lake), 1.1 kilometres east of the plant was eventually shut down because of the increasing depth of overburden encountered during quarrying and is now flooded.

The extension of these deposits on the west shore of Tod Inlet remains undeveloped. It is a high-calcium limestone bed 6 to 30 metres thick traceable for at least 45 metres along strike.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Mathews, W.H. (1945): Limestone Lens - West Side of Tod Inlet; unpublished report in Industrial Mineral File.

Mathews, W.H. (1947): Calcareous Deposits of the Georgia Strait Area; Bulletin 23, pages 20, 92, 96.

Mathews, W.H. and McCammon, J.W. (1957): Calcareous Deposits of Southwestern British Columbia; Bulletin 40, pages 85, 88.

Robertson, W.F. (1904): Manufacture of Portland Cement; Minister of Mines Report, pages 256-260.

Geological Survey of Canada:

Clapp, C.H. (1912): Southern Vancouver Island; Memoir 13, page 62.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 135, 142.

Parks, W.A. (1917): Report on the Building and Ornamental Stones of Canada; Report 452, Volume 5, pages 156-157, 186.

Sproat Lake NTS: 92F/02W
MINFILE No.: 92F 412 Latitude: 49°13'04"
Map No.: L041 Longitude: 124°58'11"

A bed of limestone, at least 60 metres thick, extends 6.5 kilometres southeastward from the south shore of Two Rivers Arm of Sproat Lake, 11 kilometres west of Port Alberni. The bed outcrops as two irregular northwest-trending bands up to 3 kilometres apart on the limbs of a northwest-trending syncline. The southwest limb is segmented by several parallel northwest-trending faults.

The bed is composed of fine-grained, dark grey limestone that weathers light grey. The limestone contains thin calcite veinlets, scattered small siliceous patches and lenses and nodules of black chert. It is intruded by a few narrow mafic dikes.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W., (1968): unpublished, untitled report in Industrial Mineral File.

Geological Survey of Canada:

Sutherland Brown, A. Yorath, C.J., Anderson, R.G. and Dom, K. (1986): Geological Maps of Southern Vancouver Island, LITHOPROBE 1; Open File 1272, Sheet 7.

QUADRA ISLAND

Open Bay NTS: 92K/03E
MINFILE No.: 92K 005 Latitude: 50°08'25"
Map No.: L042 Longitude: 125°12'27"

A belt of limestone and interbedded pillowed and amygdaloidal flows up to 1.2 kilometres wide extends 16 kilometres northwestward from Open Bay to Granite Bay on Quadra Island. It is bounded to the west by Karmutsen volcanics and intruded by granite of the Coast plutonic complex to the east. The limestone dips moderately to steeply northwest, but is intensely folded near the contact with the granite. Individual limestone beds vary from 30 to 150 metres thick.

The limestone is generally fine grained and dark bluish grey to black in colour. It commonly contains fine argillaceous laminae and a few siliceous streaks. Six samples comprised of chips taken at 3-metre intervals for lengths of up to 30 metres across the strike of the westernmost limestone bed returned the following range of analyses (in per cent) (Mathews and McCammon, 1957, p. 84): CaO, 46.18 - 51.69; MgO, 0.06 - 0.64; insolubles, 5.08 - 15.72; R_2O_3, 0.50 - 2.25; Fe_2O_3, 0.05 - 1.04; MnO, 0.006 - 0.025; P_2O_5, 0.078 - 0.119; sulphur, 0.13 - 0.62; ignition loss, 37.00 - 43.27. The analysis of a sample of intensely folded limestone to the east also reported by Mathews and McCammon (1957) is given in Table 8.

A few test pits were excavated on the shore of Open Bay near an old lime kiln sometime before 1946. Not more than a few tens of tonnes of limestone were quarried.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Mathews, W.H. (1947): Calcareous Deposits of the Georgia Strait Area; Bulletin 23, pages 88-91.

Mathews, W.H. and McCammon, J.W. (1957): Calcareous Deposits of Southwestern British Columbia; Bulletin 40, pages 82-84.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 161, 175.

Parsons Bay Formation

Various limestone outcrops on Vancouver and Harbledown Islands have been mapped as Parsons Bay Formation. It is comprised of carbonate and clastic sediments of Upper Triassic age that conformably overly the Quatsino Formation. In a few instances the unit rests directly on basaltic and andesitic flows of the Upper Triassic Karmutsen Formation. Volcanics and sediments of the Lower Jurassic Bonanza Group unconformably overlie the Parsons Bay Formation.

The Parsons Bay Formation is distributed in a similar manner as the Quatsino Formation. On northern Vancouver Island it outcrops adjacent to the three major belts of Quatsino limestone. Throughout the rest of the island it occurs sporadically as isolated fault- bounded blocks commonly associated with the Quatsino Formation. The Parsons Bay Formation outcrops on the east and west ends of Harbledown Island. Thicknesses vary from 610 metres in the Alice Lake area on northern Vancouver Island to 35 metres in the Cowichan Lake area on southern Vancouver Island.

The Parsons Bay Formation consists of thinly bedded, black argillite, calcareous siltstone and sandstone, and black to medium grey limestone. One distinct limestone member, the Sutton limestone, can be distinguished at or near the top of the formation. This unit is comprised of massive, sandy and biohermal (coral) limestone of latest Triassic age. In general, the Parsons Bay limestones are silty and argillaceous with abundant carbonaceous matter however purer limestones of limited thicknesses are occasionally present.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Massey, N.W.D. and Friday, S.J. (1987): Geology of the Cowichan Lake Area, Vancouver Island (92C/16); in Geological Fieldwork 1986, Paper 1987-1, pages 223-229.

Massey, N.W.D., Friday, S.T., Tercier, P.E. and Rublee, V.J. (1987): Geology of the Cowichan Lake Area (92C/16); Open File 1987-2, 9 sheets.

Geological Survey of Canada:

Muller, J.E. (1969): Alberni, British Columbia; Map 17-1968.

Muller, J.E. (1977): Geology of Vancouver Island; Open File 463.

Muller, J.E. (1982): Geology of Nitinat Lake Map Area, British Columbia; Open File 821.

Muller, J.E. (1985): Geology, Victoria, British Columbia; Map 1553A.

Muller, J.E., Cameron, B.E.B. and Northcote, K.E. (1981): Geology and Mineral Deposits of the Nootka Sound Map Area, Vancouver Island, British Columbia; Paper 80-16, pages 12-14 and accompanying Map 1537A, Nootka Sound, British Columbia.

Muller, J.E. and Carson, D.J.T. (1969): Geology and Mineral Deposits of the Alberni Map Area, Vancouver Island and Gulf Islands; Paper 68-50, pages 15-16.

Muller, J.E., Northcote, K.E. and Carlisle, D. (1974): Geology and Mineral Deposits of the Alert Bay - Cape Scott Map Area, Vancouver Island, British Columbia; Paper 74-8, pages 15-19 and accompanying Map 4-1974.

Muller, J.E. and Roddick, J.A. (1983): Geology of Alert Bay - Cape Scott, B.C.; Map 1552A.

Sutherland Brown, A. Yorath, C.J., Anderson, R.G. and Dom, K. (1986): Geological Maps of Southern Vancouver Island, LITHOPROBE 1; Open File 1272, 10 sheets.

Harbledown Island NTS: 92L/10E
MINFILE No.: 92L 152 Latitude: 50°33'55"
Map No.: L043 Longitude: 126°30'54"

A band of limestone extends for at least 1.6 kilometres westward from the southeast shore of Harbledown Island. On the north side the band is overlain and partially interbedded with argillite and minor volcanics. To the south it is underlain and partially interbedded with basaltic flows of the Karmutsen Formation. Bedding strikes 050° to 090° and dips 20° to 90° northwest. The limestone bed averages 215 metres in thickness. Dikes varying from 30 to 60 centimetres wide commonly intrude the limestone.

The deposit is comprised of friable, medium-grained, sugary textured, dark bluish grey limestone with a streaked appearance. Occasional narrow bands, veinlets and lenses of white calcite are present. Scattered pyrite grains are also evident. The average analysis of three chip samples taken perpendicular to the strike of the band is given in Table 9.

TABLE 9
ANALYSES OF PARSONS BAY LIMESTONE

Deposit	Map No.	ID	CaO %	MgO %	SiO_2 %	Al_2O_3 %	Insol. %	R_2O_3 %	Fe_2O_3 %	MnO %	P_2O_5 %	S %	LOI %	H_2O %
Harbledown Is.	L043	1	53.08	0.087			5.0		0.11	0.27	0.045	0.018		
Cluxewe River	L044	2	55.24	0.20			0.26	0.22	0.05	0.013	0.01	0.010	43.88	0.17

Notes

1. Average of three chip samples taken in succession across 137 m perpendicular to the strike of the limestone (McCammon, 1954, p. 184, Samples 1-3).
2. Composite of chips taken at 90 cm intervals over a length of 18 m along a face at the south end of the quarry (McCammon, 1968, p. 318, Sample 17).

Granby Mining Corporation diamond drilled 17 holes in 1958 after some initial work by R.H. Chestnut as early as 1954.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Chestnut, R.H. (1954): unpublished report in Industrial Mineral File.

McCammon, J.W. (1954): Harble-ite Limestone Deposit; Minister of Mines Report, pages 183-184.

McCammon, J.W. (1954): unpublished map in Industrial Mineral File.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 165-166, 175.

Parks, W.A. (1917): Report on the Building and Ornamental Stones of Canada; Report 452, Volume 5, pages 155-156.

Cluxewe River NTS: 92L/11E
MINFILE No.: 92L 283 Latitude: 50°33'02"
Map No.: L044 Longitude: 127°08'45"

Several exposures of fine-grained, dark grey to black limestone occur along the Benson Lake Road, 4.5 kilometres southwest of Port McNeill. The deposit lies on the east end of a fault-bounded block of Parsons Bay Formation 4.5 kilometres long and 1.5 kilometres wide. A quarry developed in one of these exposures shows bedding (?) that strikes north and dips 56° west. Pods of dark chert accompany the limestone. The analysis of a composite chip sample along a face on the south end of the quarry is given in Table 9.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1968): Limestone Deposits of the North End of Vancouver Island; Minister of Mines Report, pages 315, 318.

KUNGA GROUP

The Kunga Group contains the only significant limestone resources on the Queen Charlotte Islands. The group is named after the thick sections of Upper Triassic to Lower Jurassic calcareous sediments exposed on Kunga Island off the east coast of Moresby Island. It is composed of a lower, massive grey limestone (Sadler Formation), a middle, thinly bedded black limestone (Peril Formation) and an upper, calcareous black argillite (Sandilands Formation). The lower two units correlate with the Quatsino and Parsons Bay formations on Vancouver Island and Texada Island. The group rests conformably on a platform of Upper Triassic basaltic volcanics of the Karmutsen Formation. Lower Jurassic shale and sandstone of the Maude Formation usually overly the group. Of the two limestone members the Sadler Formation has the most potential for containing deposits suitable for most industrial applications.

The Sadler Formation varies from less than 30 metres to at least 180 metres thick. It is generally exposed in northwesterly trending belts of limited extent, mostly on Moresby Island and the surrounding smaller islands. The thicker sections are exposed at the Tasu mine on the west coast of Moresby Island, on Gillatt Arm on the east coast of the island, on Kunga, Burnaby and Copper Islands east of Moresby Island and on Sandilands Island in Skidegate Inlet. Figure 8 shows the distribution of the Sadler Formation on the southern Queen Charlotte Islands.

The formation is composed of uniform grey, massive to thickly bedded limestone that is rarely siliceous or dolomitic. The limestone is locally intercalated with mafic flows and sills, and is occasionally cut by dikes. The unit has been subjected to extensive faulting and varying degrees of folding.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Sutherland Brown, A. (1968): Geology of the Queen Charlotte Islands, Bulletin 54, pages 50-61, 175, Figure 34.

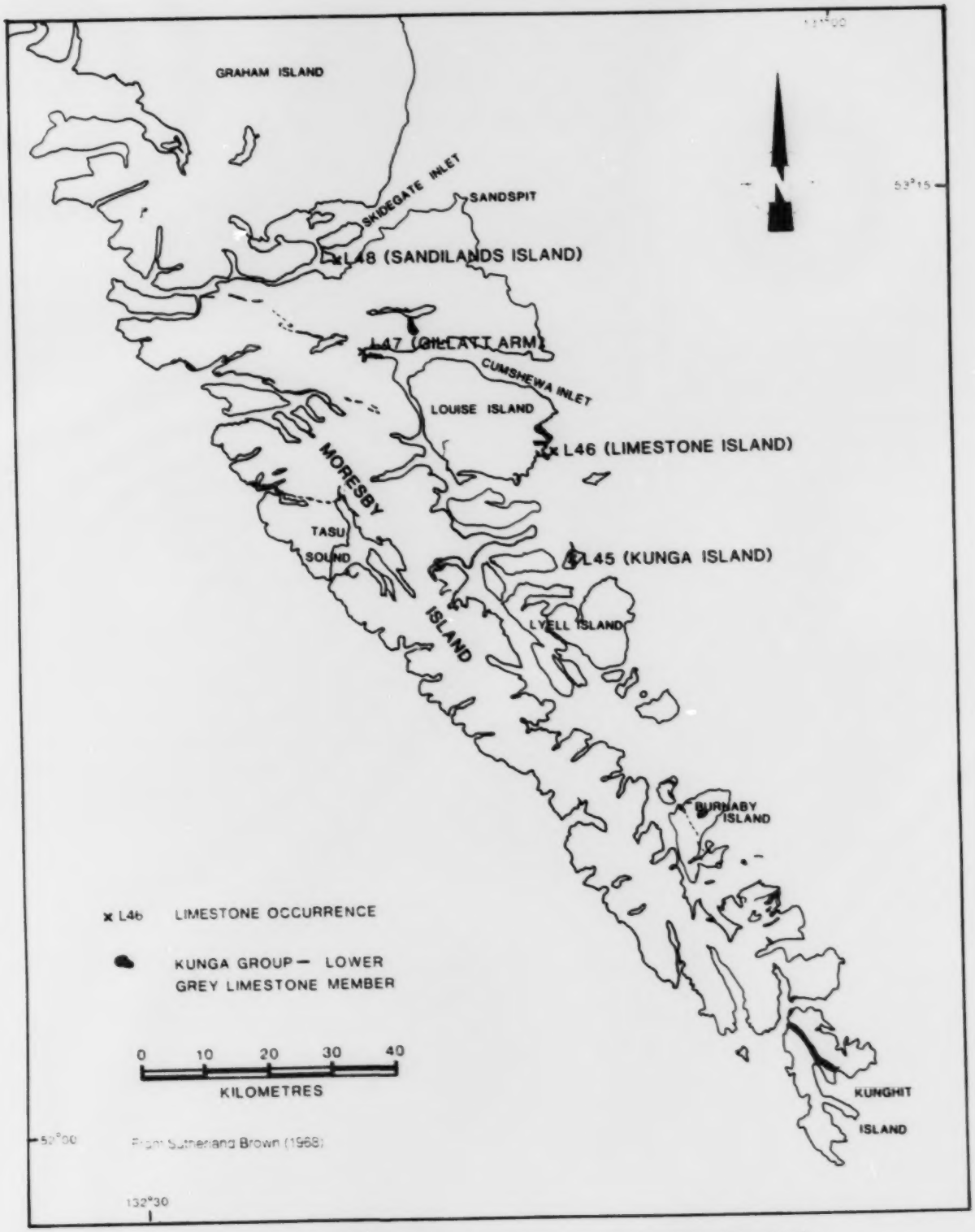

Figure 8. Distribution of Kunga Group Lower Limestone Member (Sadler Formation).

Geological Survey of Canada:

Cameron, B.E.B. and Hamilton, T.S. (1988): Contributions to the Stratigraphy and Tectonics of the Queen Charlotte Islands Basin, British Columbia; in Current Research, Paper 1988-1E, pages 221-227.

Kunga Island NTS: 103B/13E
MINFILE No.: 103B 060 Latitude: 52°45'40"
Map No.: L045 Longitude: 131°34'20"

A bed of massive grey limestone strikes north across Kunga Island for 3 kilometres and dips 40° to 60° east. The unit is bounded to the west by Karmutsen volcanics and to the east by thinly bedded black limestone of the Peril Formation. On the north shore of the island the bed is 180 metres thick and contains a mafic flow or sill 23 metres thick. The average analysis of a composite chip sample across a stratigraphic thickness of 152 metres on the south shore of Kunga Island is given in Table 10.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Sutherland Brown, A. (1968): Geology of the Queen Charlotte Islands, Bulletin 54, page 175.

Limestone Island NTS: 103B/13E
MINFILE No.: 103B 061 Latitude: 52°54'30"
Map No.: L046 Longitude: 131°36'40"

Massive, grey limestone outcrops over the entire surface of Limestone Island, a small island covering a 700 by 700 metre area just east of Louise Island. The limestone is extensively folded and faulted in places. The analysis of three chip samples representing a 60-metre stratigraphic section on the southwest shore of the island is given in Table 10.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1959): assays and cross section in Industrial Mineral File.

Sutherland Brown, A. (1968): Geology of the Queen Charlotte Islands, Bulletin 54, page 175.

Gillatt Arm (Cumshewa Inlet) NTS: 103F/01E 103G/04W
MINFILE No.: 103F 038, 103G 007 Latitude: 53°02'45"
Map No.: L047 Longitude: 132°01'47"

Several masses of limestone outcrop in the vicinity of Gordon Cove at the head of Gillatt Arm on the east coast of Moresby Island.

A band of limestone (MINFILE No. 103G 007) 500 to 600 metres wide extends eastward from Gordon Cove along the south shore of Gillatt Arm for 2500 metres. The limestone strikes northeast and dips approximately 50° northwest.

Across Gordon Cove, 500 metres to the west, a second limestone deposit (MINFILE No. 103F 038) continues west-northwest for 1300 metres. Bedding strikes east and dips 50° north. Drilling has indicated the limestone bed is at least 29 metres thick.

The western deposit is composed of dark grey to white, medium to coarse-grained limestone containing minor quartz. It is cut by frequent calcite stringers and a few narrow fault-breccia zones. The average analysis of samples from three drill holes is given in Table 10. City Resources (Canada) Limited evaluated this deposit in 1987 as a potential source of limestone for a neutralizing medium at its Cinola epithermal gold deposit.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon J.W.: Undated, unpublished Geological Map in Industrial Mineral File.

Tolbert, R. (1987): Geological, Geochemical and Drilling Report on the Lime Claims; Assessment Report 16566.

TABLE 10
ANALYSES OF KUNGA LIMESTONE

Deposit	Map No.	ID	CaO %	MgO %	SiO_2 %	Al_2O_3 %	Insol. %	R_2O_3 %	Fe_2O_3 %	MnO %	P_2O_5 %	S %	LOI %	H_2O %
Kunga Island	L045	1	53.20	0.11			4.29	0.20	0.17	0.07	0.21	0.004	42.03	
Limestone Is.	L046	2	54.45	0.06			2.37	0.33	0.25	0.030	<0.001	0.006	42.74	
Gillatt Arm	L047	3	51.96	0.12	4.73	0.498			0.28	0.015	0.109		39.04	

Notes

1. Composite of chips taken at intervals of 6 m across a stratigraphic thickness of 150 m on the south shore of Kunga Island (Sutherland Brown, 1968, p. 175).
2. Average of three chip samples representing a stratigraphic thickness of 60 m on the southwest shore of Limestone Island (Sutherland Brown, 1968, p. 175).
3. Average of samples from three drill holes (Tolbert, 1987).

Sandilands Island NTS: 103F/01E
MINFILE No.: 103F 039 Latitude: 53°10'20"
Map No.: L048 Longitude: 132°05'10"

Light grey, massive, high-calcium limestone outcrops on the southeast corner of Sandilands Island in Skidegate Inlet, just south of Maude Island. The beds strike west-southwest and dip 10° to 30° northwest. The limestone is cut by irregular calcite veinlets up to 5 centimetres thick. The occasional grain of plagioclase is visible in thin section.

Selected Bibliography

Geological Survey of Canada:

MacKenzie, J.D. (1916): Geology of Graham Island, British Columbia; Memoir 88, pages 88, 173.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, page 158.

BONANZA GROUP

The Bonanza Group is comprised largely of basaltic to rhyolitic flows, tuffs and breccias with minor intercalations of argillite and greywacke of Lower Jurassic age outcropping mostly along the west side of Vancouver Island. A broad belt of Bonanza rocks that follows the coast for 180 kilometres on northern Vancouver Island is reported to contain occasional thin-bedded, fine-grained, dark grey limestones (Campbell, 1973, p. 5). Most of these are probably Parsons Bay limestone occurring in various fault-bounded blocks. The only documented limestone deposit of any significance within the Bonanza Group outcrops on Kashutl Inlet.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Campbell, D.D. (1973): Geology Report - Kashutl Inlet Limestone; unpublished report in Industrial Mineral File.

Geological Survey of Canada:

Muller, J.E. (1974): Alert Bay - Cape Scott, British Columbia; Map 4-1974.

Muller, J.E. (1977): Geology of Vancouver Island; Open File 463.

Muller, J.E. Cameron, B.E.B. and Northcote, K.E. (1981): Geology and Mineral Deposits of Nootka Sound Map Area, Vancouver Island, British Columbia; Paper 80-16, pages 14-17 and accompanying Map 1537A, Nootka Sound, British Columbia.

Muller, J.E., Northcote, K.E. and Carlisle, D. (1974): Geology and Mineral Deposits of Alert - Cape Scott Map Area, Vancouver Island, British Columbia; Paper 74-8, page 19, 22-27.

Muller, J.E. and Roddick, J.A. (1983): Geology of Alert Bay - Cape Scott, B.C.; Map 1552A.

Kashutl Inlet NTS: 92L/03W
MINFILE No.: 92L 187 Latitude: 50°09'23"
Map No.: L049 Longitude: 127°18'56"

Limestone outcrops along the cliffs and bluffs on the west side of Kasautl Inlet, 4.5 kilometres south of the head of the inlet on the west coast of Vancouver Island.

The deposit is comprised of two beds of limestone separated by 30 to 45 metres of argillite that are overlain and underlain by volcanics consisting largely of amygdaloidal andesite and dacite.

These rocks have been subjected to some low grade thermal metamorphism by an intrusion exposed just north of the deposit. The entire sequence strikes northeast and dips 30° to 60° south. The upper (southern) bed is approximately 45 metres thick while the lower bed is approximately 60 metres thick.

The carbonate beds consist of massive, pearl-grey to white, medium to coarse-grained limestone (marble). Analyses of three samples comprised of chips taken at intervals of 4.6 metres across accessible outcrops of the upper limestone bed are given in Table 11 (Campbell, 1973, p. 7).

Probable (indicated) reserves are calculated at 7.6 million tonnes of limestone assuming a strike length of 180 metres for each bed and a down-dip extension of 150 metres (Campbell, 1973, pp. 1, 8). The deposit is estimated to contain a total potential of at least 27 million tonnes of limestone.

The limestone was examined and sampled by Douglas D. Campbell during 1958 and 1962. Sicamous Resources Ltd. (B.C. Pyrophyllite Co. Ltd.) held a lease over the deposit in the early 1970s. In 1984 C.K. & G. Management Ltd. of Port Coquitlam, B.C. attempted unsuccessfully to acquire the mineral rights to the deposit.

TABLE 11
ANALYSES OF BONANZA LIMESTONE FROM KASHUTL INLET

Sample	Length	CaO	$CaCO_3$	MgO	Insol.	Al_2O_3	Fe_2O_3	Undetermined
K1	30 m	55.06	98.26	0.30	0.60	0.36	0.34	0.14
K2	45 m	54.92	98.01	0.20	1.01	0.30	0.32	0.16
K3	60 m	54.83	97.84	0.30	1.20	0.31	0.25	0.10

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Campbell, D.D. (1973): Geology Report - Kashutl Inlet Limestone; unpublished report in Industrial Mineral File.

WARK AND COLQUITZ GNEISSIC COMPLEX

The Wark and Colquitz gneissic complex forms a belt 10 to 14 kilometres wide that extends 40 kilometres from Victoria and Saanich west-northwest to the Koksilah River, where it is truncated by the San Juan fault. The complex is comprised of well-foliated hornblende-plagioclase gneiss (Wark gneiss) and irregularly foliated biotite-quartz-plagioclase gneiss (Colquitz gneiss) with minor amphibolite, greenstone and limestone (marble). Paleozoic zircon age dates and the presence of crinoidal limestone northwest of Sooke Lake (N.W.D. Massey, 1989, personal communication) and on Esquimalt Harbour (S. Dumais, 1989, personal communication) suggest that these rocks are derived from the Sicker and Buttle Lake groups. The various limestone beds and lenses within this metamorphic complex may therefore be equivalent to the Mount Mark Formation (Buttle Lake limestone).

The majority of the limestone occurrences are found within the Wark gneiss. A few deposits occur in the Colquitz gneiss at or near the contact with the Wark gneiss. The most significant occurrence is the Rosebank deposit on the west shore of Esquimalt Harbour. A few smaller deposits occur in the same vicinity. Limestone lenses are also found just east of Langford, south of Tenook Lake in the Highland District, west of Saanich Inlet at Wrigglesworth and Devereux Lakes and northwest of Sooke Lake in the Greater Victoria watershed.

These deposits are generally composed of high-calcium, recrystallized limestone (marble), sometimes accompanied by zones of siliceous and magnesian limestone. Dikes frequently intrude the deposits.

Selected Bibliography

Geological Survey of Canada:

Muller, J.E. (1985): Geology, Victoria, British Columbia; Map 1553A.

Rosebank

MINFILE No.: 92B 024 NTS: 92B/06W
Map No.: L050 Latitude: 48°26'37"
Longitude: 123°27'29"

The Rosebank deposit is situated on the west side of Esquimalt Harbour, 9 kilometres west of Victoria. Limestone was quarried here and burnt on site to produce lime between 1906 and 1933.

A band of limestone 400 metres wide within greenstone in the Wark gneiss extends at least 2 kilometres westward from the shore of Esquimalt Harbour. The limestone strikes 110° and dips 70° southwest to 70° northeast. It is extensively fractured. A distinct fracture cleavage strikes northwest and dips approximately 70° northeast. Randomly orientated, greenish, mafic dikes a few centimetres to 15 metres wide are locally quite numerous.

The deposit is comprised of very fine grained, dark bluish grey to nearly white limestone that is commonly banded parallel to the fracture cleavage. In thin section the limestone displays interlocking recrystallized calcite grains with less than 1 per cent quartz. Chlorite is commonly found coating fractures. Most of the limestone is high-calcium in composition. Occasional patches and small masses of magnesian limestone occur along the margins of the band and along contacts with dikes. Analyses of two grab samples reported by Goudge (1944) are given in Table 12.

Limestone was produced from a series of quarries along a ridge 400 to 900 metres west of Esquimalt Harbour. The main quarry, 120 metres long, 60 metres wide and up to 15 metres deep, was located 460 metres inland from the shore. The limestone was burned in two or three kilns on the shore. This operation was initially carried out by Raymond & Sons from 1906 to 1910. The Rosebank Lime Company Ltd. continued production of lime and hydrated lime from 1911 to 1932. Raw limestone was also sold for rubble and agricultural purposes. A total of 218 280 tonnes of limestone was quarried between 1912 and 1933. In 1933 the plant was dismantled and the property was eventually acquired by the Department of National Defense.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Mathews, W.H. (1947): Calcareous Deposits of the Georgia Strait Area; Bulletin 23, page 99.

Mathews, W.H. and McCammon, J.W. (1957): Calcareous Deposits of Southwestern British Columbia; Bulletin 40, pages 91-92.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 130-132, 142.

TABLE 12
ANALYSES OF LIMESTONES IN THE WARK AND COLQUITZ GNEISSES AND WESTCOAST COMPLEX

Deposit	Map No.	ID	CaO %	MgO %	SiO_2 %	Al_2O_3 %	Insol. %	R_2O_3 %	Fe_2O_3 %	MnO %	P_2O_5 %	S %	LOI %	H_2O %
Rosebank	L050	1	54.70	0.60	1.08	0.44			0.12			0.06		
		2	33.75	16.39	1.52	0.15			0.33			trace		
Millstream	L051	3	52.1	3.08			0.5	0.04	0.20	0.004	0.013	0.025	43.8	0.14
Atkins Road	L052	4	55.2	0.11			0.6	0.08	0.09	0.010	0.014	0.017	43.6	0.14
Wrigglesworth L.	L053	5	54.5	0.44			1.5	0.16	0.07	0.006	0.009	0.01	43.3	0.11
Malahat	L054	6	54.10	0.24			2.3	0.10	0.10	0.002	0.019	0.03	42.8	0.12
Parsons Bridge	L055	7	53.45	1.07			2.25	0.42	0.33	0.015	0.012	0.070	42.4	0.08
Nitinat Lake W.	L057	8	53.3	0.39			3.38	0.34	0.17	0.006	0.008	0.06	42.3	0.16

Notes

1. Sample from a quarry 900 m from Esquimalt Harbour (Goudge, 1944, p. 142, Sample 1).
2. Sample of magnesian limestone taken between the quarry (Sample 1) and Esquimalt Harbour (Goudge, 1944, p. 142, Sample 1B).
3. Composite of chips taken at 1.5 m intervals across 15 m of limestone in the northernmost quarry (Mathews and McCammon, 1957, p. 90).
4. Composite of chips taken at 1.8 m intervals across 18 m of limestone in a small pit north of Atkins Avenue (Mathews and McCammon, 1957, p. 91).
5. Chip sample across 107 m of limestone near the northwest end of the band (Mathews and McCammon, 1957, p. 90).
6. Chip sample along 53.8 m of quarry face (Mathews and McCammon, 1957, p. 89, Sample 4).
7. Average of two 18 m chip samples taken in succession across the quarry face and adjacent slope (Mathews and McCammon, 1957, p. 91).
8. Composite of chips taken at 3 m intervals along the shore for 229 m (Mathews and McCammon, 1957, p. 90).

Millstream (Highland)

NTS: 92B/05E
MINFILE No.: 92B 025
Latitude: 48°28'55"
Map No.: L051
Longitude: 123°30'25"

The Millstream deposit is located 2 kilometres east of Mount Finlayson on the east side of Millstream Road, 13 kilometres west-northwest of Victoria.

Fine-grained, banded, partly recrystallized limestone is contained in a lens 1000 metres long and 300 metres wide in greenstone within the Wark gneiss. The banding dips from 40° northwest to 20° southeast. Numerous dikes intrude the deposit. Irregular lenses and masses of white-weathering wollastonite are reported to occur in the limestone. An analysis reported by Mathews and McCammon (1957) is given in Table 12.

Limestone was produced from two quarries 320 metres apart, prior to 1908. It was burnt on site in several kilns to produce lime. Quarrying was suspended because higher transportation costs made it uneconomic to compete with similar operations located near tide-water.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Mathews, W.H. (1947): Calcareous Deposits of the Georgia Strait Area; Bulletin 23, pages 97-98.

Mathews, W.H. and McCammon, J.W. (1957): Calcareous Deposits of Southwestern British Columbia; Bulletin 40, page 90.

Atkins Road (Langford)

NTS: 92B/06W
MINFILE No.: 92B 026
Latitude: 48°26'58"
Map No.: L052
Longitude: 123°28'24"

The Atkins Road deposit is located along Atkins Avenue, adjacent to the Esquimalt and Nanaimo Railway, 1.4 kilometres east of Langford Station and 9 kilometres west of Victoria. It consists of a mass of limestone in the Wark gneiss, outcropping for 200 to 300 metres along both sides of the road and railway with widths of up to 60 metres. Banding within the limestone dips west and is cut by a few contorted diabase dikes. A thick deposit of fluvioglacial sand and gravel partially covers the deposit.

The limestone is fine grained, light bluish grey and lightly banded. In thin section calcite and muscovite grains forming a lineation are cemented by fine-grained argillaceous calcite. The limestone is generally high calcium in composition. A few small masses of dolomite are exposed in the west face of the quarry south of the road and railway. An analysis reported by Mathews and McCammon (1957) is given in Table 12.

Quarrying operations began in 1907 after the construction of a sand-lime brick plant by the Silica Brick & Lime Company. The Vancouver-Victoria Lime & Brick Company acquired the operation in 1911 and continued quarrying limestone through to 1912. Production was from three small quarries on the north side of the road and railway and one larger quarry on the south side.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Mathews, W.H. (1947): Calcareous Deposits of the Georgia Strait Area; Bulletin 23, page 98.

Mathews, W.H. and McCammon, J.W. (1957): Calcareous Deposits of Southwestern British Columbia; Bulletin 40, pages 90-91.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 132, 142.

Wrigglesworth Lake NTS: 92B/12E
MINFILE No.: 92B 021 Latitude: 48°31'14"
Map No.: L053 Longitude: 123°34'27"

This occurrence is located just west of Wrigglesworth Lake on the southwest corner of Lot 8, 2.2 kilometers west of Saanich Inlet and 20 kilometres northwest of Victoria. It consists of a band of limestone extending 400 metres northwest from the south end of Wrigglesworth lake. The band varies in width from 75 metres at its southeast end to 105 metres at its northwest end. The southeast end of the band is faulted against interbedded ribbon cherts, slates and tuffs of the Leech River Formation by the Malahat fault.

The band is bounded to the southwest by gneissic greenstone of the Colquitz gneiss. The Wark gneiss outcrops to the northeast. A few mafic dikes intrude the limestone.

The occurrence is comprised of fine to medium-grained, dark grey to white limestone. Scattered small lenses of chert are present. An analysis reported by Mathews and McCammon (1957) is given in Table 12.

This occurrence was first prospected by J. Wrigglesworth in 1891. A number of test pits are reported to have been excavated.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Mathews, W.H. and McCammon, J.W. (1957): Calcareous Deposits of Southwestern British Columbia; Bulletin 40, pages 89-90.

Malahat (Jefford) NTS: 92B/12E
MINFILE No.: 92B 022 Latitude: 48°32'42"
Map No.: L054 Longitude: 123°36'31"

The Malahat deposit is located a kilometre northwest of Devereux Lake, near the northwestern edge of Lot 201, 3.75 kilometres west of Saanich Inlet and 24 kilometres northwest of Victoria. A lens of limestone extends 300 metres northwest from the north end of a small lake. The lens strikes 100° and dips 45° to 80° south. Exposed widths vary from 18 metres on the southeast end to 76 metres on the northwest end. The lens terminates to the northwest in a series of bluffs. The limestone appears to continue underneath the lake to the southeast. It is bounded on the southwest by the Colquitz gneiss and the by the Wark gneiss on the northeast, and is intruded by a few mafic dikes up to a metre wide that tend to parallel the strike of the lens.

The lens consists of fine to medium-grained, dark bluish grey to white limestone containing occasional films of white siliceous material. An analysis reported by Mathews and McCammon (1957) is given in Table 12.

Limestone was produced from a single quarry by Marble & Associated Products Ltd. between 1944 and 1950. A total of 1424 tonnes of limestone was quarried for stucco dash, poultry grit, fillers and foundry flux.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Mathews, W.H. (1947): Calcareous Deposits of the Georgia Strait Area; Bulletin 23, page 97.

Mathews, W.H. and McCammon, J.W. (1957): Calcareous Deposits of Southwestern British Columbia; Bulletin 40, pages 88-89.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 134-136, 142.

Parsons Bridge NTS: 92B/06W
MINFILE No.: 92B 020 Latitude: 48°27'13"
Map No.: L055 Longitude: 123°27'26"

The Parsons Bridge occurrence is located 300 metres southwest of Parsons Bridge on the east side of the Island Highway (Highway 1A) at the head of Esquimalt Harbour. A steeply dipping lens of limestone, 30 metres wide, strikes 000° to 030° for 60 metres within the Wark gneiss. It is bounded to the east and southeast by a granitic intrusion and greenstone dikes intrude the limestone.

The rock is fine grained, bluish grey and high calcium in composition. An analysis reported by Mathews and McCammon (1957) is given in Table 12.

Limestone was initially quarried here and burnt on site by Thomas Atkins for a few years beginning in 1912. Between 1917 and 1922 Lime Producers Ltd. and Northwestern Lime Co. operated the quarry for lime manufacturing. By 1938 Victoria Lime Co. was quarrying and burning limestone for agricultural purposes. Quarrying ceased in 1941. Between 1917 and 1941, 7694 tonnes of limestone were quarried.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Mathews, W.H. (1947): Calcareous Deposits of the Georgia Strait Area; Bulletin 23, pages 98-99.

Mathews, W.H. and McCammon, J.W. (1957): Calcareous Deposits of Southwestern British Columbia; Bulletin 40, page 91.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 132, 142.

WEST COAST COMPLEX

The West Coast Complex consists of a belt of metamorphic and plutonic rocks extending discontinuously for 220 kilometres along the west coast of Vancouver Island, from Nootka Island southeastwards to Port Renfrew. These rocks, largely amphibolites, diorites and quartz diorites, were emplaced during an early Jurassic period of intense metamorphism. Various bodies of recrystallized limestone have been mapped within this belt between Barclay Sound and Port Renfrew. These are probably correlative with the Quatsino Formation, which occurs frequently east of the belt. The most significant masses of limestone are found on either side of the south end of Nitinat Lake. Several limestone bodies occur 7 to 9 kilometres north-northwest of Port Renfrew along the Gordon River and 12.5 to 17.5 kilometres northeast of Port Renfrew north of the San Juan River. In addition, a band of limestone outcrops for 3 kilometres along Walbran Creek, 7 kilometres from the coast. Various other limestones outcrop on the southeast side of Barclay Sound on Dixon Island and Dixon Point, and just north of the sound, 2 kilometres south of Broughton Peaks.

Selected Bibliography

Geological Survey of Canada:

Muller, J.E. (1982): Geology of the Nitinat Lake Map Area, British Columbia; Open File 821.

Nitinat Lake - Southeast Side

NTS: 92C/10W
MINFILE No.: 92C 010
Latitude: 48°41'24"
Map No.: L056
Longitude: 124°47'57"

This occurrence is situated on the southeast shore of Nitinat Lake, near its outlet to the Pacific Ocean, 33 kilometres northwest of Port Renfrew. It is comprised of two masses of limestone; the larger one extends 3 kilometres northeast along the shore of Nitinat Lake directly opposite occurrence L057. This deposit varies up to 500 metres in width. To the southeast the limestone is in contact with diorite and granodiorite. Seven hundred metres to the southwest a smaller mass of limestone outcrops along the shore of Nitinat Lake over a 900 by 1100 metre area. It is bounded to the southwest and southeast by the same granitic rocks. Bedding in both deposits generally strikes northwest and dips between 30° and 90° northeast.

These deposits are comprised of dark, impure limestone containing some siliceous and dolomitic beds.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Mathews, W.H. and McCammon, J.W. (1957): Calcareous Deposits of Southwestern British Columbia; Bulletin 40, page 97.

Geological Survey of Canada:

Sutherland Brown, A. Yorath, C.J., Anderson, R.G. and Dom, K. (1986): Geological Maps of Southern Vancouver Island, LITHOPROBE 1; Open File 1272, Sheet 3.

Canada Department of Mines and Resources:

Parks, W.A. (1917): Report on the Building and Ornamental Stones of Canada; Report 452, Volume 5, page 149.

Nitinat Lake - Northwest Side

NTS: 92C/10W
MINFILE No.: 92C 011
Latitude: 48°41'49"
Map No.: L057
Longitude: 124°48'49"

This occurrence is located near the south end of Nitinat Lake on its northwest shore, 4 kilometres from the Pacific Ocean and 34 kilometres northwest of Port Renfrew.

A mass of limestone up to a kilometre wide extends northeast along the shore of Nitinat Lake for 2.8 kilometres. To the northwest the limestone is in fault contact with granodiorite and diorite. The thickly bedded

limestone generally strikes 100° to 120° and dips 35° to 65° northeast and is intruded by a few dikes.

The deposit consists of coarse-grained, white limestone (marble) containing some fine-grained, thinly bedded siliceous layers and a few dolomitic beds. An analysis reported by Mathews and McCammon (1957) is given in Table 12.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Mathews, W.H. and McCammon, J.W. (1957): Calcareous Deposits of Southwestern British Columbia; Bulletin 40, pages 97-98.

Geological Survey of Canada:

Sutherland Brown, A. Yorath, C.J., Anderson, R.G. and Dom, K. (1986): Geological Maps of Southern Vancouver Island, LITHOPROBE 1; Open File 1272, Sheet 3.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, page 141.

Parks, W.A. (1917): Report on the Building and Ornamental Stones of Canada; Report 452, Volume 5, page 149.

COAST BELT

The Coast Belt (Coast plutonic complex) comprises a belt of granitic rocks of Jurassic to Tertiary age that follows the British Columbia coast northwestward into Alaska. Numerous screens of metamorphosed country rock, varying from metres to kilometres in width, are distributed along the length of the complex as wedges and roof pendants; carbonate deposits are occasionally preserved. The southern part of the belt contains pendants probably derived from Upper Triassic units of the Wrangellia Terrane (Quatsino and Karmutsen formations). To the north Paleozoic to early Mesozoic metasediments and metavolcanics of the Alexander Terrane predominate.

Carbonates incorporated in the Coast Belt almost always show evidence of high-temperature metamorphism. They are usually recrystallized and bleached white to lighter shades of grey. Erratic contamination by pyrite and silicates is quite common and can be extensive. Skarn zones containing a variety of calcium silicates are sometimes developed along the margins of the deposits where they contact intrusive rock and most of the deposits have undergone varying degrees of dolomitization due to circulating hydrothermal fluids generated by the adjacent intrusions. The dolomite sometimes occurs in beds several metres thick intercalated with beds of calcium to high-calcium limestone of similar thickness, as on the east coast of Banks Island. Dolomite is more commonly developed within the deposits as disseminations, lenses and irregular masses millimetres to metres in width that become more numerous toward the margins of the deposits. More uniform dolomitization over greater widths, such as on the Sechelt Peninsula, is uncommon. Dikes are abundant in some deposits and rare in others. Carbonates in the northern part of the belt are commonly interbedded with other metamorphic rocks.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Bacon, W.R. (1957): Geology of the Lower Jervis Inlet, British Columbia; Bulletin 39, pages 17, 37.

Watson, K. DeP. (1948): The Squaw Creek - Rainy Hallow Area; Bulletin 25, pages 19-21.

Geological Survey of Canada:

Anonymous (1933): Compilation - Prince Rupert Map Sheet; Map 278A.

Baer, A.J. (1973): Bella Coola - Laredo Sound Map-areas, British Columbia; Memoir 372, page 24 and accompanying maps [Bella Coola, British Columbia, Map 1327A; Laredo Sound, British Columbia, Map 1328A (Baer, A.J., Hutchison, W.W., Souther, J.G and Roddick, J.A. (1972)].

Bostock, H.H. (1963): Squamish (Vancouver West Half), British Columbia; Map 42-1963.

Graham, R.P.D. (1913): Burke Channel to Queen Charlotte Sound; Map 92A.

Dodds, C.J. (1983): Geology of the Tatshenshini River Map Area, British Columbia; Open File 926.

Hutchison, W.W. (1982): Geology of the Prince Rupert - Skeena Map Area; Memoir 394, pages 30-31, 37, 42 and accompanying Map 1472A [Hutchison, W.W., Souther, J.G., Baer, A.J. and Nelson, S. (1979)].

Hutchison, W.W., Baer, A.J., Souther, J.G. and Roddick, J.A. (1967); Prince Rupert - Skeena, British Columbia; Map 12-1966.

Roddick, J.A. (1970): Douglas Channel - Hecate Strait Map-area, British Columbia; Paper 70-41, pages 2, 7, 12-14, 16-22 and accompanying Map 23-1970.

Roddick, J.A. (1977): Stratified Rocks of Bute Inlet Map-area and notes; Open File 480.

Roddick, J.A. and Hutchison, W.W. (1967): Coast Mountains Project, British Columbia; in Report of Activities, Paper 1968-1A, pages 37-40.

Roddick, J.A., Woodsworth, G.J. and Hutchison, W.W. (1979): Geology of Vancouver West Half and Mainland Part of Alberni, Open File 611.

SOUTHERN COAST BELT

Candol Developments (Sechelt Peninsula)

NTS: 92G/12W
MINFILE No.: 92GNW031 Latitude: 49°36'04"
Map No.: D002 Longitude: 123°53'14"

Various masses of dolomite and limestone occur over a 3 kilometre length in a northwest-trending screen of Karmutsen Formation(?) metavolcanics and metasediments (Roddick *et al.*, 1979), just northwest of Carlson Lake, 13 kilometres east of Pender Harbour on the Sechelt Peninsula. The beds within the pendant strike northerly and dip moderately to steeply east. They are comprised mostly of carbonates outcropping over widths in excess of 150 metres with some amphibolite, skarn-altered metavolcanics and north-trending, steeply dipping andesitic to basaltic dikes (?) 2 to 20 metres wide. These

units are displaced by faults commonly trending 160° to 165°.

The carbonates consists of fine to coarse-grained, white to medium grey, banded limestone and fine to medium grained, white to medium grey, massive to mottled dolomite. Minor to trace amounts of quartz, muscovite, serpentine, diopside, olivine, talc, graphite and pyrite are present. The dolomite contains minor chlorite and quartz. Veins of dolomite and calcite commonly cut the massive dolomite. The average analysis of ten composite samples collected from various limestone outcrops is given in Table 13. Assays of the dolomite range from 16.8 to 20.0 per cent MgO (Ditson, 1987, p. 11).

Reserves of limestone and dolomite over a 3-kilometre strike length were initially estimated by Wright Engineering in 1983. Indicated reserves to a depth of 50 metres and inferred reserves estimated from 50 to 300 metres are given as follows in tonnes (Wright Engineering, 1983, p. 4):

	Indicated	Inferred	Total
Dolomite	17 500 000	100 000 000	117 500 000
Limestone	7 500 000	20 000 000	27 500 000

Drilling between 1985 and 1987 defined a body of dolomite 30 to 80 metres wide and at least 500 metres long, that is bounded to the west by limestone and to the east by an andesitic dike. The deposit is estimated to contain measured geological reserves of 3.5 million tonnes of dolomite averaging 19.2 per cent MgO over an average width of 55 metres, a 500-metre strike length and down to 50 metres in depth (Ditson, 1987, p. 23).

Peninsula Lime and Magnesia Ltd. carried out some stripping and mapping between 1970 and 1971. A small crushing mill was assembled by the company during this time. A minor amount of work was conducted by Stoney Plain Industries Ltd. in 1978. Candol Developments Ltd. carried out an extensive program of mapping, sampling and diamond drilling (1423 metres) between 1983 and 1987.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Bechtel Engineering Ltd. (1986): unpublished report in Industrial Mineral File.

Candol Developments Ltd. (1984): Prospectus in Industrial Mineral File.

Ditson, C. (1987): Geological, Geochemical and Drilling report on the Plain Property; Assessment Report 15593.

TABLE 13
ANALYSES OF LIMESTONES IN THE SOUTHERN COAST BELT

Deposit	Map No.	ID	CaO %	MgO %	SiO_2 %	Al_2O_3 %	Insol. %	R_2O_3 %	Fe_2O_3 %	MnO %	P_2O_5 %	S %	LOI %	H_2O %
Sechelt Peninsula	D002	1	55.3	0.5	0.7			0.2					43.3	
Beale's Quarry	L058	2	54.59	0.23	1.00	0.18			0.22			0.02		
Smith Inlet	L059	3	53.39	1.14	1.08	0.02			0.08			nil		
		4	32.48	19.61	0.06	0.19			0.09			nil		
Kocye River	L060	5	54.15	0.93	0.74	0.23			0.12			nil		
King Island	L061	6	52.64	1.22	1.81	0.30			0.21			0.01		
Nelson Island	L062	7	53.44	0.75			2.21	0.27	0.26	0.097	0.013	0.02	42.96	0.14
Frederick Arm	L063	8	48.52	2.77	5.92	1.16			0.50			0.46		
		9	32.78	17.94	2.60	0.55			0.46			0.38		
Sandell Bay	L064	10	54.59	0.43	0.71	0.14			0.24			nil		
W. Redonda Is.	L065	11	46.27	9.22	1.28	0.22			0.32				39.94*	2.94
		12	37.21	20.50	0.48	0.05			0.18				34.60*	6.48
Bold Point	L066	13	53.35	0.72			4.60	0.59	0.10	0.01	0.03	0.02	40.23	0.07
Kilbella Bay	L067	14	54.39	0.57	1.00	0.10			0.10			nil		

Notes

1. Average of ten composite samples from limestone outcrops (Wright Engineering, 1983).
2. Chip sample across 30 m of limestone (Goudge, 1944, p. 176).
3. Sample across 15 m in the centre of the deposit on north shore of Smith Inlet (Goudge, 1944, p. 175, Sample 27B).
4. Sample of white dolomite (Goudge, 1944, p. 175, Sample 27A).
5. Chip sample across 122 m at the northeast end of the limestone band (Goudge, 1944, p. 176, Sample 30A).
6. Average of two chip samples taken in succession across a total width of 30 m in the centre of the limestone band (Goudge, 1944, p. 176, Samples 31 and 31A).
7. Average of four chip samples taken in succession across 33 m in the central part of the limestone band (Mathews and McCammon, 1957, p. 95).
8. Chip sample across 30 m of limestone (Goudge, 1944, p. 175, Sample 24).
9. Chip sample across 3.7 m dolomite bed on the west side of the deposit (Goudge, 1944, p. 175, Sample 24A).
10. Average of two chip samples taken in succession across the deposit (Goudge, 1944, p. 175, Samples 28 and 28A).
11. Chip sample across 30 m quarry face in the eastern deposit (Goudge, 1944, p. 163, Sample 23).
12. Sample across 6.1 m of brucitic limestone (Goudge, 1944, p. 163, Sample 23A).
13. Composite of six chip samples taken from various parts of the belt (Mathews and McCammon, 1957, pp. 93-94).
14. Chip sample across the limestone band (Goudge, 1944, p. 175, Sample 29).

**Values reported under LOI are per cent CO_2.*

McCammon, J.W. (1972): Peninsula Lime and Magnesia Quarry; in Geology, Exploration and Mining in British Columbia 1971, pages 465-467.

Wright Engineering Ltd. (1983): unpublished report in Industrial Mineral File.

Beale's Quarry
(Cunningham Island) NTS: 93D/04W
MINFILE No.: 93D 008 Latitude: 52°11'19"
Map No.: L058 Longitude: 127°58'55"

A vertically dipping limestone bed 180 to 300 metres wide extends 1.6 kilometres northwestward for from the head of a lagoon on the south side of Cunningham Island, 10 kilometres east-northeast of Bella Bella. The bed lies within a roof pendant of greenstone enclosed in foliated granite and quartz diorite. The limestone is intruded by mafic dikes and sills and occasional tongues of granite, which become less frequent to the northwest.

The bed is comprised of white to bluish white, coarse-grained, high-calcium limestone that is occasionally siliceous and locally contaminated with serpentine. Pyrite is present near some of the dikes. The limestone also contains streaks of disseminated pyrite on the east side of the deposit. An analysis reported by Goudge (1944) is given in Table 13.

Limestone was produced from two quarries and an underground chamber on Lot 1333 near the head of the lagoon between 1923 and 1934 and during 1948 and 1949. A total of 94 425 tonnes of limestone was quarried for use in the pulp mill at Ocean Falls between 1927 and 1949.

Selected Bibliography

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 168-170, 176.

Smith Inlet NTS: 92M/06E
MINFILE No.: 92M 008 Latitude: 51°22'00"
Map No.: L059 Longitude: 127°08'46"

A band of limestone within granitic rocks outcrops on both sides of Smith Inlet near Nalos Landing, 5 kilometres from the head of the inlet. The limestone strikes 110° and dips steeply to the northeast. On the north side of the inlet the band is 700 metres wide and continues inland for 800 metres. Here the limestone is intruded by some mafic dikes that commonly parallel the strike of the band. The dikes vary up to 9 metres in width, but are usually less than a metre wide. They become numerous towards the edges of the deposit. Abundant dikes intrude the limestone on the south shore of the inlet.

The band on the north shore is composed of white, medium to coarse-grained, interbedded high-calcium limestone and dolomite that contains a trace of disseminated pyrite. The dolomite also occurs within the calcium limestone as irregular masses up to 8 metres in diameter and as fine disseminations in varying concentrations. The limestone becomes siliceous and more dolomitic along the edges of the deposit. Analyses reported by Goudge (1944) are given in Table 13.

In 1929 Coast Calcite Co. Ltd. opened up two quarries on Lot 403 along the north shore of Smith Inlet; operations were suspended a short time afterwards.

Selected Bibliography

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 166-167, 175.

Koeye River NTS: 92M/13W
MINFILE No.: 92M 012 Latitude: 51°46'56"
Map No.: L060 Longitude: 127°51'36"

A wide band of limestone extends 1000 metres northeastward from the mouth of the Koeye River, 9 kilometres south of Namu, outcropping mostly along its northwest bank. The band is within an elongate roof pendant of schist and gneiss. The limestone strikes 060°, dips almost vertically and is 122 metres wide near its northeast end.

The deposit is comprised of fine to coarse-grained, white to dark bluish grey limestone. It contains streaks, veinlets and disseminations of dolomite and silicates over most of its length, the exception being on the northeast end where the limestone lacks such impurities. Dikes commonly intrude the limestone, especially to the southwest. An analysis reported by Goudge (1944) is given in Table 13.

A total of 354 490 tonnes of limestone was quarried on the north side of the Koeye River, 1.6 kilometres northeast of Koeye Point between 1934 and 1969 for use in the Ocean Falls pulp mill.

Selected Bibliography

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 167-168, 176.

King Island NTS: 92M/13W
MINFILE No.: 92M 013 Latitude: 51°56'01"
Map No.: L061 Longitude: 127°52'25"

A band of medium grained, pale bluish grey and white, striped limestone 150 metres wide outcrops on a

point 1.2 kilometres east of the southern tip of King Island. The limestone strikes 165° for at least 550 metres and dips vertically. On the margins of the band it is interbedded with schist and argillite. Numerous dikes intrude the limestone. Analyses reported by Goudge (1944) are given in Table 13.

Some development work was carried out by F.J. Beale in 1931 and the deposit was eventually quarried for 3 months in 1949 by F.J. Beale, supplying limestone for the pulp mill at Ocean Falls.

Selected Bibliography

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 168, 176.

Nelson Island NTS: 92F/09E
MINFILE No.: 92F 100 Latitude: 49°44'36"
Map No.: L062 Longitude: 124°09'00"

This occurrence is located on the east shore of Blind Bay on Nelson Island, 68 kilometres north-northwest of Nanaimo.

A band of limestone 60 to 120 metres wide strikes 150° inland up the steep side of Blind Bay for 600 metres. The limestone probably continues under Blind Bay to the north end of Hardy Island (MINFILE No. 92F 101). The bed is situated within a roof pendant of Karmutsen Formation (?) volcanics and sediments 670 metres wide, enclosed in quartz diorite (Roddick *et al.*, 1979). The limestone is enclosed in a gneissic porphyry (altered lavas?) and banded green tuffs, and intruded by a few dikes.

The deposit is largely comprised of fine to coarse-grained white to light bluish, high-calcium limestone. The northeast side of the band contains siliceous blue limestone and dolomite. Thin lenses of white dolomite are scattered throughout the rest of the deposit.

Minor serpentine is developed on fractures. The average analysis of four chip samples reported by Mathews and McCammon (1957) is given in Table 13.

Nelson Island Lime Company produced limestone for the pulp mill at Woodfibre from a quarry and an adit between 1929 and 1936. In 1929 726 tonnes of limestone were mined; the total production between 1929 and 1936 is unknown.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Mathews, W.H. (1947): Calcareous Deposits of the Georgia Strait Area; Bulletin 23, pages 103-105.

Mathews, W.H. and McCammon, J.W. (1957): Calcareous Deposits of Southwestern British Columbia; Bulletin 40, pages 95-97.

Geological Survey of Canada:

Roddick, J.A., Woodsworth, G.J. and Hutchison, W.W. (1979): Geology of Vancouver West Half and Mainland Part of Alberni, Open File 611.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 159-160, 175.

Frederick Arm NTS: 92K/06W
MINFILE No.: 92K 136 Latitude: 50°27'16"
Map No.: L063 Longitude: 125°17'59"

A band of limestone and dolomite 300 metres wide enclosed in granitic rocks extends northwestward up the side of Treble Mountain for at least 800 metres from the west shore of Frederick Arm. The carbonates strike 125° and dip vertically. The beds are cut by fine-grained diabase dikes.

The band is composed of bluish grey, fine-grained limestone containing a few beds of white to yellowish white dolomite. Dolomite and pyrite occasionally occur as disseminated grains in the limestone. The rock is sometimes contaminated with blebs of silicates. Analyses reported by Goudge (1944) are given in Table 13.

Selected Bibliography

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 163-164, 175-176.

Sandell Bay (Rivers Inlet) NTS: 92M/12E
MINFILE No.: 92M 011 Latitude: 51°39'18"
Map No.: L064 Longitude: 127°32'17"

A band of limestone 75 to 90 metres wide outcrops on Lot 1275 on the east side of Sandell Bay, 25 kilometres up Rivers Inlet. It is bounded on the west by schist and on the east by diabase. The deposit strikes 155° for at least 460 metres.

The band is composed of medium-grained, light bluish grey and white, thinly bedded to massive, high-calcium limestone containing a trace of disseminated pyrite and a few lenticular beds of siliceous limestone. The average analysis of two chip samples taken across the deposit is given in Table 13.

Selected Bibliography

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 167, 175.

West Redonda Island NTS: 92K/07W
MINFILE No.: 92K 002 Latitude: 50°17'11"
Map No.: L065 Longitude: 124°51'00"

Two limestone deposits occur on the north shore of West Redonda Island, 100 metres west of the northwest corner of Lot 3439. Both are exposed over a width of 30 metres along the shore. The eastern deposit has been traced southwestward up the hillside for at least 60 metres and is cut by a few dikes.

The limestone is generally fine to coarse-grained, white to grey, with a bluish tint. The eastern deposit displays zones of white dolomite commonly containing grains of brucite and rare serpentine. In places dolomite occurs as bladed crystals within the limestone. Analyses reported by Goudge (1944) are given in Table 13.

The eastern deposit was periodically quarried to supply pulp and paper mills on Howe Sound up to 1926. A total of 24 125 tonnes of limestone was quarried by Nickson Construction Company between 1920 and 1924.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Grant, B. (1987): Magnesite, Brucite and hydromagnesite Occurrences in British Columbia; Open File 1987-13, pages 50-51.

Mathews, W.H. (1947): Calcareous Deposits of the Georgia Strait Area; Bulletin 23, pages 100-101.

Mathews, W.H. and McCammon, J.W. (1957): Calcareous Deposits of Southwestern British Columbia; Bulletin 40, pages 92-93.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 127, 161-163.

Parks, W.A. (1917): Report on the Building and Ornamental Stones of Canada; Report 452, Volume 5, page 162.

Cambrian Chieftain Dolomite
(Sechelt Peninsula) NTS: 92G/12W
MINFILE No.: 92GNW054 Latitude: 49°40'51"
Map No.: D003 Longitude: 123°56'14"

This occurrence is located 8.3 kilometres northeast of the community of Garden Bay on the Sechelt Peninsula. A dolomite lens lies in a northwest-trending pendant of Karmutsen Formation (?) volcanics and sediments within diorite and quartz diorite. Locally, the pendant contains lenticular masses of dolomite and limestone with minor chert and argillite intercalated with basaltic flows. These beds strike north and dip vertically to steeply east. They are cut by few vertical andesitic and dioritic dikes that commonly strike 140°.

The dolomite lens is at least 310 metres long and up to 37 metres wide on surface, averaging 30 metres in exposed width. It is composed of white to grey, mottled, crystalline dolomite containing epidote and calcite veinlets and sparse pyrite grains. Nine 4.5- kilogram samples randomly collected over the dolomite lens assayed 18.8 to 21.1 per cent MgO, averaging 19.8 per cent (Bacon, 1957, p. 17). Six of these samples returned the following range in compositions (Bacon 1957, p. 39): CaO, 30.6 to 33.1 per cent; MgO, 18.8 to 21.7 per cent; SiO_2, 2.9 to 5.1 per cent; R_2O_3, 0.4 to 0.9 per cent; Fe_2O_3, 0.4 to 0.6 per cent; loss on ignition, 41.9 to 45.1 per cent.

A mass of thinly bedded, white to grey crystalline limestone outcrops just west of the dolomite lens. Its north end hosts magnetite-chalcopyrite skarn zones that have been sporadically mined.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Bacon, W.R. (1957): Geology of the Lower Jervis Inlet, British Columbia; Bulletin 39, pages 17, 39.

Mathews, W.H. and McCammon, J.W. (1957): Calcareous Deposits of Southwestern British Columbia; Bulletin 40, page 97.

Bold Point (Quadra Island) NTS: 92K/03E
MINFILE No.: 92K 004 Latitude: 50°10'34"
Map No.: L066 Longitude: 125°10'20"

Two or more bodies of bluish grey limestone form a northeast-trending belt 300 metres long and 60 metres wide in granitic rocks on Lot 4, 1.6 kilometres north of Bold Point on the east side of Quadra Island. An analysis reported by Mathews and McCammon (1957) is given in Table 13.

A few tonnes of limestone are reported to have been quarried here before 1925.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Mathews, W.H. (1947): Calcareous Deposits of the Georgia Strait Area; Bulletin 23, pages 101-102.

Mathews, W.H. and McCammon, J.W. (1957): Calcareous Deposits of Southwestern British Columbia; Bulletin 40, page 93.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, page 161.

Kilbella Bay NTS: 92M/11W
MINFILE No.: 92M 016 Latitude: 51°40'55"
Map No.: L067 Longitude: 127°21'53"

A band of white, coarse-grained limestone 15 to 30 metres wide extends for at least 500 metres north-northwest up the mountainside, west of the entrance of Kilbella Bay on the north shore of Rivers Inlet. The band is hosted in greenstone and granite which also occur as inclusions within the limestone. Veins of magnetite and pyrite are also present. An analysis reported by Goudge (1944) is given in Table 13.

Selected Bibliography

Geological Survey of Canada:

Graham, R.P.E. (1908): Geology of the Coast from Kingcove Inlet to Dean Channel, including Adjacent Islands; in Summary Report 1908, page 40.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 167, 175.

NORTHERN COAST BELT

Laredo Limestone
(Aristazabal Island) NTS: 103A/11E
MINFILE No.: 103A 001 Latitude: 52°41'16"
Map No.: L068 Longitude: 129°02'55"

A mass of limestone enclosed in hornblende diorite, monzonite and gneiss outcrops along the northeast coast of Aristazabal Island from just north of Quarry Bay southeastwards for 1.8 kilometres. The mass extends inland for 5 kilometres. The limestone is intruded by a few northwest-trending, steeply dipping granodiorite dikes averaging a metre in width and by a small stock of hornblende diorite along the shore at Quarry Bay. A northwest-trending fault cuts the limestone along Quarry Bay. North of Quarry Bay banding (bedding ?) strikes north-northeast and dips 55° to 60° to the west. To the south the banding strikes northwest and dips 35° to 65° southwest

The deposit is comprised mostly of snowy white, coarse-grained high-calcium limestone (marble) with some light to dark grey, fine-grained, variably dolomitic bands 0.02 to 1.25 metres thick. A bed of dolomitic limestone outcrops in the western and southwestern portions of the deposit with a surface width of approximately 200 metres. The carbonate is contaminated by variable amounts of pyrite, pyrrhotite, forsterite, serpentine, spinel and graphite. Brightness is reported to vary between 94 and 96 per cent (D.G. Matheson, 1991, personal communication). An analysis reported by McCammon (1970) is given in Table 14.

Total reserves are estimated at 90 million tonnes grading 54.3 per cent CaO, (97 per cent $CaCO_3$) with a cut-off grade of 50.4 per cent CaO, (90 per cent $CaCO_3$), with a potential for an additional 1.9 billion tonnes (Laredo Limestone Ltd., 1988, p. 2). Proven (measured geological) and probable (indicated) reserves determined for two zones within the deposit are reported as follows in millions of tonnes (Rotzien, 1989, p. 4):

Area	Class	High-calcium Limestone	Calcium Limestone	Total
1	Proven	8.00	1.50	9.50
2	Proven	2.25	3.00	5.25
Total Proven Reserves		10.25	4.50	14.75
1	Probable	8.00	2.00	10.00
2	Probable	17.25	18.75	36.00
Total Probable Reserves		25.25	20.75	46.00
Total Reserves:		35.50	25.25	60.75

A total of 10 900 tonnes of limestone averaging 54.9 per cent CaO (98 per cent $CaCO_3$) was quarried in 1952. The property has been sampled and diamond drilled by various operators since then. Laredo Limestone Ltd. has been exploring the property since 1983. The company plans to commence quarrying in early 1991 at a rate of 8000 tonnes per day, to produce white limestone for architectural and decorative purposes, primarily for the California market.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Anonymous: Report on Limestone Deposits of the Pacific Northwest; undated, unpublished report in Industrial Mineral File, page 5.

Beale, S. (1987): Prospecting Report on the Lorina Claim; Assessment Report 16188.

TABLE 14
ANALYSES OF LIMESTONES IN THE NORTH COAST BELT

Deposit	Map No.	ID	CaO %	MgO %	SiO_2 %	Al_2O_3 %	Insol. %	R_2O_3 %	Fe_2O_3 %	MnO %	P_2O_5 %	S %	LOI %	H_2O %
Laredo Limestone	L068	1	53.93	1.33			0.17	0.09	0.05	trace	0.01	0.002	43.75	0.01
Kumealon Inlet	L069	2	52.35	2.07	1.04	0.18			0.14			0.04		
		3	55.06				2.11						43.51	
Limestone Bay	L070	4	52.80	0.85	1.66	0.53			0.20			0.03		
		5	31.72	20.62	0.78	0.15			0.08			nil		
Banks Island	L071	6	54.56	0.72	0.24	0.18			0.07			nil		
		7	31.84	20.77	0.24	0.08			0.23			trace		
Swamp Point	L072	8	54.78	0.25	0.95	0.19			0.27					
		9	52.18	0.45	4.06	0.54			0.92					
Lawrence	L073	10	54.8	0.24			0.56	0.24						
Smith Island	L078	11	54.64	0.38	0.98	0.11			0.08			nil		
Hammer Island	L079	12	51.06	0.51	6.12	0.51			0.49			nil		
Princess Royal Is.	L080	13	53.88	0.72	1.56	0.25			0.18			0.02		

Notes

1. *Composite of chips taken at 15 cm intervals across a 12 m band of coarse-grained white limestone in the quarry on the southeast corner of Lot 299 (McCammon, 1970, p. 392, Sample 2).*
2. *Chip sample across 27.4 m of coarse-grained white limestone near the northeast edge of the deposit (Goudge, 1944, p. 176, Sample 36A).*
3. *Average of eight 3 m chip samples taken in succession across a face parallel to the shore (Bown, 1958, Samples A to H).*
4. *Chip sample across 15.2 m of light grey limestone on the northwest side of the deposit (Goudge, 1944, p. 176, Sample 35).*
5. *Chip sample across 4.6 m coarse-grained white dolomite near the southwest edge of the deposit (Goudge, 1944, p. 176, Sample 35A).*
6. *Chip sample across 30 m of high-calcium limestone (Goudge, 1944, p. 176, Sample 34).*
7. *Chip sample across 9 m dolomite lens (Goudge, 1944, p. 176, Sample 34A).*
8. *Channel sample across limestone free of siliceous bands (Goudge, 1944, p. 175, Sample A).*
9. *Channel sample across limestone with siliceous bands (Goudge, 1944, p. 175, Sample B).*
10. *Marble from the Lawrence claim (Lot 955)(Watson, 1948, p. 20).*
11. *Sample of purer limestone (Goudge, 1944, p. 176, Sample 39).*
12. *Sample taken across the limestone band (Goudge, 1944, p. 176, Sample 38).*
13. *Sample of the purest limestone (Goudge, 1944, p. 176, Sample 33).*

Laredo Limestone Ltd. (1988): prospectus for mining lease, in Industrial Mineral File.

McCammon, J.W. (1970): Laredo Limestone Quarry; in Geology, Exploration and Mining in British Columbia 1969, pages 389-392.

Rotzien, J.L. (1989): Report on the Laredo Limestone Claims, for Dolmage Campbell & Associates; in Industrial Mineral File.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, page 171.

Kumealon Inlet NTS: 103H/13W, 103G/16E

MINFILE No.: 103H 073 Latitude: 53°52'49"

Map No.: L069 Longitude: 129°59'46"

A carbonate sequence 520 metres thick outcrops at the head of Kumealon Inlet, on the east side of Grenville Channel, 54 kilometres south-southeast Prince Rupert. The unit is bounded on the southwest by fine-grained biotite schist and on the northeast by locally dioritized greenstone schist. The deposit strikes 120° for at least 6.5 kilometres and dips 55° southwest to vertical.

The sequence is composed mostly of fine to coarse-grained, white and bluish grey, high-calcium limestone with some thin beds and lenticular masses of dolomite. The limestone becomes pyritic and interbedded with schist over a 9-metre width on the southwest margin of the deposit. Several bands of mica schist and igneous rock up to 9 metres thick occur within the limestone. An analysis reported by Goudge (1944) is given in Table 14.

Prospecting has outlined a zone of purer limestone outcropping along the southwest shore of Kumealon Lagoon, 1000 to 2200 metres northwest of the head of Kumealon Inlet. The zone is comprised mostly of white, recrystallized, fine to coarse-grained limestone with some blue to grey, coarse-grained limestone and minor dolomite as lenses, streaks and beds up to 0.3 metre thick. It strikes 150° for at least 1200 metres and dips vertically to steeply southwest. The zone is estimated to have an average stratigraphic thickness of 180 metres. The limestone contains minor fine-grained disseminated pyrite and rare tremolite. No dikes are evident within the zone. The average analysis of eight 3-metre chip samples reported by Bown (1958) is given in Table 14.

The deposit was examined by Columbia Cellulose Company Limited in 1958, during a search for local sources of limestone for its Prince Rupert pulp mill.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Bown, C.D. (1958): untitled, unpublished report in Industrial Mineral File.

Rae, D.H. (1958): untitled, unpublished report in Industrial Mineral File.

Reyes, F.A. (1985): Limestone Deposit, Kumealon Lagoon, Grenville Channel; unpublished report in Industrial Mineral File.

Geological Survey of Canada:

Roddick, J.A. (1970): Douglas Channel - Hecate Strait Map-area, British Columbia; Paper 70-41, pages 16-17, 21.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 174, 176.

Parks, W.A. (1917): Report on the Building and Ornamental Stones of Canada; Report 452, Volume 5, pages 172, 173.

Limestone Bay
(Despair Point, Banks Island) NTS: 103H/05W
MINFILE No.: 103H 038 Latitude: 53°26'31"
Map No.: L070 Longitude: 129°58'35"

A band of limestone 240 to 300 metres wide outcrops on Despair Point on the northeast coast of Banks Island and continues southeastward for 1.2 kilometers. It contacts gneissic diorite and migmatite to the northwest and quartz diorite to the west. The limestone strikes 100° and dips vertically. It is occasionally split into two bands by pyrrhotite-impregnated quartzite and banded silicified schist.

The deposit is comprised mostly of white, coarse-grained limestone and minor grey, medium-grained limestone with irregular interbeds and masses of dolomite. Analyses reported by Goudge (1944) are given in Table 14.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Mandy, J.T. (1930): Banks Island; Minister of Mines Report, page 68.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 173, 176.

Lot 2224 (Banks Island) NTS: 103H/05W
MINFILE No.: 103H 039 Latitude: 53°23'59"
Map No.: L071 Longitude: 129°55'03"

A steeply dipping bed of limestone 180 metres thick striking 130° to 140° outcrops on Lot 2224 on the northeast coast of Banks Island, 12 kilometres northwest of Keecha Point. The limestone contains interbeds of schist that become numerous toward the edges of the deposit.

The bed consists of erratically intermingled white, high-calcium limestone and dolomite. The dolomite occurs as thin beds to large lenses that are more frequent near the margins of the bed. Analyses reported by Goudge (1944) are given in Table 14.

Selected Bibliography

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, page 173.

Swamp Point (Portland Canal) NTS: 103O/08E
MINFILE No.: 103O 017 Latitude: 55°28'29"
Map No.: L072 Longitude: 130°02'30"

This occurrence is located at Swamp Point on the east shore of Portland Canal, about 50 kilometres south of Stewart. Swamp Point lies on the west side of a roof pendant of volcanics and sediments, covering a 14.4 by 9.6 kilometre area, within the Coast plutonic complex. These rocks strike north to northeast and dip 40° to 85° east.

At Swamp Point a bed of white to dark bluish grey, medium to coarse-grained limestone 60 metres thick strikes 000° and dips steeply to the east. It is folded and cut by a few thin dikes. Siliceous streaks containing pyrite, actinolite and mica are common throughout the limestone. Analytical data reported by Goudge (1944) are given in Table 14.

Limestone was produced from two quarries operated by Granby Mining, Smelting & Power Company Ltd. between 1916 and 1922, for use as flux at the company's copper smelter at Anyox. A total of 257 300 tonnes of limestone was quarried.

Selected Bibliography

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, page 175.

Lawrence NTS: 114P/09W, 10E
MINFILE No.: 114P 085 Latitude: 59°35'19"
Map No.: L073 Longitude: 136°30'00"

A belt of metamorphic rocks engulfed in granodiorite and diorite extends northward into British Columbia from Alaska for 20 kilometres, varying up to 6 kilometres in width. In the vicinity of Mineral Mountain and Rainy Hollow, in the headwaters of the Klehini River, the belt consists of limestone (marble), argillite quartzite, gneiss and schist with some skarn.

The limestone is medium to coarse grained and light grey to white in colour. It occurs as beds up to 150 metres thick and as lenses and irregular masses that form conspicuous bare knolls. Some garnet or epidote-quartz skarn alteration is developed along the margins of some of the limestone bodies. An analysis of marble from the Lawrence claim (Lot 955) is given in Table 14.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Watson, K. DeP. (1948): The Squaw Creek - Rainy Hallow Area; Bulletin 25, pages 20-21.

Marmor NTS: 103H/01E
MINFILE No.: 103H 063 Latitude: 53°06'29"
Map No.: L074 Longitude: 128°12'23"

A northwest-trending mass of thickly bedded, coarse-grained, grey limestone 16 kilometres long and up to 900 metres wide outcrops between Marmor Peak and the headwaters of the Mussel River, 110 kilometres south-southeast of Kitimat. The deposit is enclosed in hornblende and epidote-rich gneissic skarn flanked by garnet-bearing schists, gneisses and hornblende-plagioclase amphibolites. The limestone is intercalated with quartz zones commonly containing chlorite, epidote and muscovite. An extensive stockwork of pegmatite cuts the limestone.

Selected Bibliography

Geological Survey of Canada:

Roddick, J.A. (1970): Douglas Channel - Hecate Strait Map-area, ritish Columbia; Paper 70-41, pages 11, 22.

Colby Bay (Banks Island) NTS: 103G/09
MINFILE No.: 103G 046 Latitude: 53°34'27"
Map No.: L075 Longitude: 130°15'33"

A band of white, intermixed high-calcium limestone and dolomite, at least 270 metres wide, outcrops on the northeast shore of Banks Island, 8 kilometres northwest of Colby Bay, and continues inland for some distance. The band and associated chert and siltstone lie in a northwest-trending metasedimentary wedge, 8 kilometres long, enclosed in diorite. The limestone bed strikes 120° and dips steeply southwest. It is relatively free of dikes but much of the dolomite is siliceous.

Various other occurrences of white and rose-coloured limestone, sometimes containing wavy lenses of diorite, are reported in this wedge of metasediments.

Selected Bibliography

Geological Survey of Canada:

Roddick, J.A. (1970): Douglas Channel - Hecate Strait Map-area, British Columbia; Paper 70-41, page 22.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, page 173.

Frederick Point (Digby Point) NTS: 103J/08W
MINFILE No.: 103J 011 Latitude: 54°15'20"
Map No.: L076 Longitude: 130°21'40"

A band of limestone at least 180 metres wide is exposed at Frederick Point on the south end of Digby Island, 1.5 kilometres southwest of Prince Rupert. It is enclosed in graphitic schist within a broad belt of Permo-Triassic metasediments. The limestone strikes 115° to 130° and dips 35° to 65° northwest.

The deposit is largely composed of white to bluish grey, medium-grained, banded limestone containing thin zones of darker, more resistant siliceous limestone that are more numerous toward the margins of the band. Some secondary mica is developed in the limestone.

Selected Bibliography

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, page 175.

Parks, W.A. (1917): Report on the Building and Ornamental Stones of Canada; Report 452, Volume 5, pages 127, 173-174.

Gale Point
(Banks Island, Lot 797) NTS: 103H/05W
MINFILE No.: 103H 062 Latitude: 53°15'40"
Map No.: L077 Longitude: 129°48'09"

A band of white, coarse-grained limestone and dolomite 180 metres wide outcrops on Lot 797 on the east coast of Banks Island, 2.5 kilometres south of Gale Point. The bed is contained in a roof pendant of gneissic diorite and migmatite within granodiorite. The deposit strikes

125° and dips steeply northeast to vertical. Numerous inclusions of country rock are present along the northeast edge of the band. Sinuous quartzite fragments are sometimes found floating in the limestone. The dolomite commonly contains veins of white quartz.

Selected Bibliography

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 171, 173.

Smith Island
(Columbia Cellulose) NTS: 103J/01E
MINFILE No.: 103J 012 Latitude: 54°10'10"
Map No.: L078 Longitude: 130°12'10"

A limestone band at least 30 metres wide, enclosed in Permo-Triassic biotite-muscovite schists follows the north shore of Tsum Tsadai Inlet on the west side of Smith Island for 1.0 kilometre. The bed strikes 050° and dips 53° northeast.

The deposit is comprised of bluish white, coarse-grained limestone that is interbedded with schist along the margins of the band. The limestone is commonly contaminated with thin beds of highly siliceous limestone (calcareous quartzite); some brown mica, white tremolite and pyrite are also present. An analysis reported by Goudge (1944) is given in Table 14.

An extension of the band outcrops 1.5 kilometres to the east and continues along the north shore of the inlet for 2.5 kilometres. A quarry was opened on this part of the deposit in 1950 by Columbia Cellulose Company Limited but was abandoned in 1952 because of the impurities in the limestone. Total production between 1950 and 1952 amounted to 9460 tonnes.

Selected Bibliography

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 174-176.

Hanmer Island
(Whitecliff Island) NTS: 103J/01E
MINFILE No.: 103J 032 Latitude: 54°03'25"
Map No.: L079 Longitude: 130°15'00"

A limestone band hosted in schist forms a cliff 30 metres high on the southern tip of Hanmer Island (Whitecliff Island), 29 kilometres south of Prince Rupert. The rock is intensely folded and intruded by dikes.

The band contains medium to fine-grained, white to greyish limestone sometimes displaying a pinkish cast. The deposit is contaminated in places, with irregular masses of white quartz of variable size. Some siliceous streaks paralleling bedding are also present. An analysis reported by Goudge (1944) is given in Table 14.

Selected Bibliography

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 174, 175.

Parks, W.A. (1917): Report on the Building and Ornamental Stones of Canada; Report 452, Volume 5, pages 127, 174-175.

Princess Royal Island NTS: 103A/15E
MINFILE No.: 103A 007 Latitude: 52°54'08"
Map No.: L080 Longitude: 128°31'27"

A gently westward dipping bed of limestone 12 to 15 metres thick is exposed for 300 metres along the east shore of Princess Royal Island on Lots 146 and 147, 11 kilometres south of the village of Swanson Bay. It is overlain by schist in contact with granite. Dikes frequently intrude the limestone.

The deposit is composed of white, coarse-grained limestone (marble) containing inclusions of schist and quartzite that parallel the bedding. Quartz veins and streaks of mica and pyrite are common.

An analysis of the purest limestone reported by Goudge (1944) is given in Table 14.

Limestone was produced from two quarries earlier this century to supply the pulp mill at Swanson Bay. A total of 4540 tonnes of limestone was quarried between 1919 and 1922.

Selected Bibliography

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 171, 176.

Claxton NTS: 103J/01E
MINFILE No.: 103J 033 Latitude: 54°05'30"
Map No.: D004 Longitude: 130°05'00"

A large deposit of dolomite occurs 300 metres from tide-water at Claxton, 24 kilometres south of Prince Rupert. A sample contained 20.0 per cent MgO (41.9 per cent $MgCO_3$) (McCammon and Hora, 1980, p. 4).

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W., and Hora, Z.D. (1980): Dolomite Occurrences in B.C.; unpublished report in Industrial Mineral File, page 4.

INTERMONTANE BELT

CHILLIWACK GROUP

The Lower Pennsylvanian to Lower Permian Chilliwack Group comprises a sequence of argillite, siltstone, sandstone, chert limestone and pyroclastic rocks outcropping on both sides of the Fraser Valley from Harrison Lake to the U.S. border. Two distinct limestone units have been recognized within this sequence, a Lower Pennsylvanian unit roughly 30 metres thick and a Lower Permian unit commonly 60 to 90 metres thick, but sometimes up to 600 metres thick. The Lower Permian unit frequently occurs as two members separated by a bed of argillite and greywacke. The more significant limestone exposures occur on the south end of Harrison Lake, on the north bank of the Fraser River near Agassiz, and in the Cascade Mountains just south of Popkum and on either side of the Chilliwack River. These deposits are extensively faulted and folded.

The Lower Pennsylvanian unit is generally composed of medium to dark grey, well-bedded, argillaceous limestone, while the Lower Permian unit is commonly comprised of light grey, massive limestone that is sometimes dolomitic and frequently contaminated with nodules, lenses and bands of chert.

Selected Bibliography

Geological Survey of Canada:

Monger, J.W.H. (1970): Hope Map-area, West Half, British Columbia; Paper 69-47, pages 6-10 and accompanying Map 12-1969.

Monger, J.W.H. (1989): Hope, B.C.; Map 41-1989.

Chilliwack River - North Side NTS: 92H/04E
MINFILE No.: 92HSW089 Latitude: 49°05'33"
Map No.: L081 Longitude: 121°42'00"

Several Lower Permian limestone members are exposed in a section of interbedded limestone, greywacke, argillite and chert extending 1600 metres along the north side of the Chilliwack River, 19 kilometres east of Vedder Crossing. An upper limestone member 120 metres thick is separated from a lower member of unknown thickness by a bed of argillite and greywacke. The limestone strikes northwest and dips 20° to 50° northeast.

The two members are composed of recrystallized, medium grey limestone with some irregular masses and veinlets of white calcite and quartz. The upper member contains thin beds and lenses of black chert. An analysis of a sample from the upper member is given in Table 15.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Mathews, W.H. and McCammon, J.W. (1957): Calcareous Deposits of Southwestern British Columbia; Bulletin 40, pages 41-42.

Chilliwack River - South Side NTS: 92H/04E
MINFILE No.: 92HSW088 Latitude: 49°04'35"
Map No.: L082 Longitude: 121°42'38"

A Lower Permian sequence of grey, recrystallized limestone with interbedded greywacke, chert and argillite

TABLE 15
ANALYSES OF CHILLIWACK LIMESTONES

Deposit	Map No.	ID	CaO %	MgO %	SiO_2 %	Al_2O_3 %	Insol. %	B_2O_3 %	Fe_2O_3 %	MnO %	P_2O_5 %	S %	LOI %	H_2O %
Chilliwack R.	L081	1	50.3	0.29			8.24	0.44	0.34	0.005	0.022	0.12	40.1	0.12
	L082	2	43.6	2.50			15.1	0.47	0.42	0.05	0.03	0.06	37.8	0.06
Popkum Lmst.	L083	3	45.75	0.68			15.58	0.21	0.14	0.016		0.09	37.44	0.08
Agassiz	L084	4	40.2	0.68			15.6	6.83	0.69	0.12	0.04	0.24	35.5	0.09
		5	48.8	0.61			11.2	0.72	0.40	0.14	0.01	0.04	38.1	0.09
Bear Mtn.	L085	6	51.6	0.16			10.1	0.42	0.19	0.007	0.025	0.003	37.1	0.07

Notes

1. Chip sample across the top 61 m of the upper limestone member (Mathews and McCammon, 1957, p. 42).
2. Chip sample across the top 30 m of the upper limestone member (Mathews and McCammon, 1957, p. 41).
3. Average of two chip samples taken in succession across 24.3 m of limestone in a quarry in the western bed (Mathews and McCammon, 1957, p. 42).
4. Average of three chip samples taken in vertical succession over a height of 21 m in the central quarry (Mathews and McCammon, 1957, p. 43).
5. Sample taken across the face of the east quarry (24 m) (Mathews and McCammon, 1957, p. 43).
6. Chip sample across 79 m at the south end of the deposit (Mathews and McCammon, 1957, p. 44).

120 metres thick is exposed for 700 metres along the northwest flank of a northeast-trending knoll on the south side of the Chilliwack River, 18 kilometres east of Vedder Crossing. The section consists of an upper limestone member 60 metres thick, separated from a lower limestone member 30 metres thick by 30 metres of cherty argillite and greywacke. The sequence strikes northeast and dips variably southeast. Both members contain chert bands and lenses. The analysis of a chip sample across the top 30 metres of the upper limestone member is given in Table 15.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Mathews, W.H. (1947): Calcareous Deposits of the Georgia Strait Area; Bulletin 23, pages 48-49.

Mathews, W.H. and McCammon, J.W. (1957): Calcareous Deposits of Southwestern British Columbia; Bulletin 40, page 41.

Popkum Limestone NTS: 92H/04E
MINFILE No.: 92HSW009 Latitude: 49°11'57"
Map No.: L083 Longitude: 121°43'05"

Two Lower Permian limestone beds outcrop as two north-trending bands, 300 metres apart, along the base of Mount Cheam for at least 600 metres. This locality is 1.3 kilometres southeast of Popkum on the south side of the Fraser Valley. The western bed is at least 24 metres thick and the eastern bed at least 60 metres thick. The limestone and interbedded siliceous argillite strike 150° and dip 30° northeast.

Both beds are largely composed of dark grey, medium-grained limestone containing some chert lenses and beds, and a few veinlets and masses of quartz and calcite. At the north end of the western bed the carbonate contains lenses and thin beds of fine-grained siliceous limestone. Analyses reported by Mathews and McCammon (1957) are in Table 15.

Limestone was produced by various operators from two quarries in the western bed between 1917 and 1970. Most of the production came from a quarry on the north end of the bed. A smaller quarry lies just to the south. Most of the limestone was quarried by Fraser Valley Lime Supply Company Ltd. between 1949 and 1970. Total production between 1917 and 1970 amounted to 193 840 tonnes.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Mathews, W.H. (1947): Calcareous Deposits of the Georgia Strait Area; Bulletin 23, page 50.

Mathews, W.H. and McCammon, J.W. (1957): Calcareous Deposits of Southwestern British Columbia; Bulletin 40, pages 42-43.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, page 179.

Agassiz NTS: 92H/04W
MINFILE No.: 92HSW123 Latitude: 49°13'17"
Map No.: L084 Longitude: 121°47'55"

A limestone bed 9 to 21 metres thick outcrops on the south end of a northeast-trending ridge on the north bank of the Fraser River, 3 kilometres southwest of Agassiz. It is exposed on the crest of a small westerly plunging anticline. The deposit is overlain by siliceous tuff or impure quartzite and underlain by greenstone. The contact between the quartzite and the limestone strikes 075° and dips 45° north on the north limb of the fold. Three steeply dipping mafic dikes striking 000° to 060° are exposed in several quarries.

The limestone is fine grained and light grey to bluish grey in colour, with dark streaks and scattered pyrite grains. Analytical results reported by Mathews and McCammon (1957) are given in Table 15.

A total of 21,800 tonnes of limestone was produced from three quarries between 1941 and 1958 by Agassiz Lime Quarry.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Mathews, W.H. (1947): Calcareous Deposits of the Georgia Strait Area; Bulletin 23, pages 50-51.

Mathews, W.H. and McCammon, J.W. (1957): Calcareous Deposits of Southwestern British Columbia; Bulletin 40, pages 43-44.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, page 177.

Bear Mountain NTS: 92H/05
MINFILE No.: 92HSW124 Latitude: 49°17'29"
Map No.: L085 Longitude: 121°45'00"

A limestone bed at least 76 metres thick is exposed for 1600 metres along the steep southwest face of Bear

Mountain on the south end of Harrison Lake, just east of Harrison Hot Springs. The limestone and the enclosing siliceous argillite strike northwest and dip steeply to vertically. The bed pinches out to the northwest and is truncated by a mass of granodiorite to the southeast.

The deposit is composed of medium to coarse-grained, white to grey to brown limestone with scattered argillaceous interbeds. An analysis reported by Mathews and McCammon (1957) is given in Table 15.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Mathews, W.H. and McCammon, J.W. (1957): Calcareous Deposits of Southwestern British Columbia; Bulletin 40, page 44.

CACHE CREEK GROUP

The Cache Creek Group contains the most significant resources of high-purity limestone in the interior of the province. The group comprises massive carbonates ranging in age from Mississippian to Permian, within a sequence of argillite, chert and mafic volcanics of Mississippian to Late Triassic age. The carbonates occur both in beds hundreds of metres thick forming extensive belts of limestone or in thinner beds and lenses much more local in extent.

The Cache Creek Group is exposed in three northwest-trending, fault-bounded belts referred to here as the Cache Creek complex (southern), Stuart Lake belt (central) and the Atlin Terrane (northern). The Cache Creek complex, the type area of the Cache Creek Group, trends north-northwest for 250 kilometres between latitudes 50°30′ and 52°40′. The belt is dominated by folded and faulted carbonates of the Middle to Upper Permian Marble Canyon Formation. This formation outcrops discontinuously for 175 kilometres between the Thompson River and Sringhouse Hills in the central belt of the Cache Creek Complex, over widths of up to 19 kilometres. The most significant exposures are confined to a band 10 to 15 kilometres wide that begins in the Marble Canyon and continues north-northwest for 65 kilometres to Big Bar Creek. It is referred to here as the Marble Canyon - Big Bar band. The southern part of this band is shown on Figure 9. Three kilometres north of Marble Canyon the band contains approximately 400 metres of massive limestone with black chert stringers underlain by at least 150 metres of basalt and chert (Mortimer, 1987). Some 20 kilometres to the northwest two distinct limestone members of the Marble Canyon Formation outcrop west of Clinton (Figure 10). The lower member is comprised of 18 to 197 metres of well-bedded limestone with thin lenses and beds of chert, while the upper member consists of massive limestone varying from at least 37 metres to 253 metres in thickness. The two members are separated by approximately 90 metres of siltstone, chert and volcanic rocks.

The Stuart Lake belt extends northwestward for 420 kilometres between latitudes 52°55′ and 56°10′. A major Pennsylvanian to Permian carbonate unit ranging in thickness from 460 to 3000 metres is exposed in the northern half of the belt, outcropping for some 230 kilometres along its eastern margin adjacent to the Pinchi fault. A synclinal fold preserves an overlying sequence of ribbon chert, argillite and greenstone over a length of 75 kilometres between Tezzeron and Tchento lakes, causing the carbonate unit to outcrop as two distinct bands. The western band outcrops for 160 kilometres between Gordon Lake and Leo Creek over widths of up to 9 kilometres. The eastern band extends northwestward from the west end of Tezzeron Lake for 150 kilometres to the Omineca River and varies up to 6 kilometres in width. The continuity of these limestone bands is affected by a few scattered intrusions and minor faulting. In places they are obscured by a thick cover of glacial sediments. The limestone is typically massive, fine to medium grained and bluish grey in colour; in the vicinity of the Pinchi fault it is variably dolomitic.

The Atlin Terrane trends northwest to west-northwest for 400 kilometres between latitudes 58°10′ and 60°40′. Significant carbonates are contained in three formations that have been subjected to a moderate amount of folding and faulting. The Teslin Formation, comprised mostly of massive, pale grey weathering, dark grey to black, fine-grained limestone of Permian age, outcrops in sporadically distributed, northwest-trending bands largely confined to the northeastern part of the Atlin Terrane ("Northeastern Facies Belt," Monger, 1975). The unit varies from 600 metres to less than 300 metres in thickness. Significant outcrops occur west of Dease Lake in the French Range, and west and south of Teslin Lake. The Horsefeed Formation is exposed in the southwestern part of the Atlin Terrane ("Southwestern Facies Belt"). It contains 900 to 1500 metres of mostly massive, pale grey to buff-grey, porcelaneous (cryptocrystalline), fossiliferous limestone of Late Mississippian to Late Permian age. The formation outcrops extensively southeast of Nakina River and west of Atlin Lake near the Yukon border. The Kedahda Formation is comprised mostly of chert and argillite with minor lenses and beds of volcanics and carbonates outcropping throughout the Atlin Terrane. The Kedahda carbonates form lenticular bodies ranging from small isolated pods to masses up to 800 metres long and 100 metres thick or more continuous beds up to 30 metres thick. These carbonates consist largely of grey to brownish weathering, pale to dark grey, massive, fine-grained limestone of Mississippian and Early Permian age.

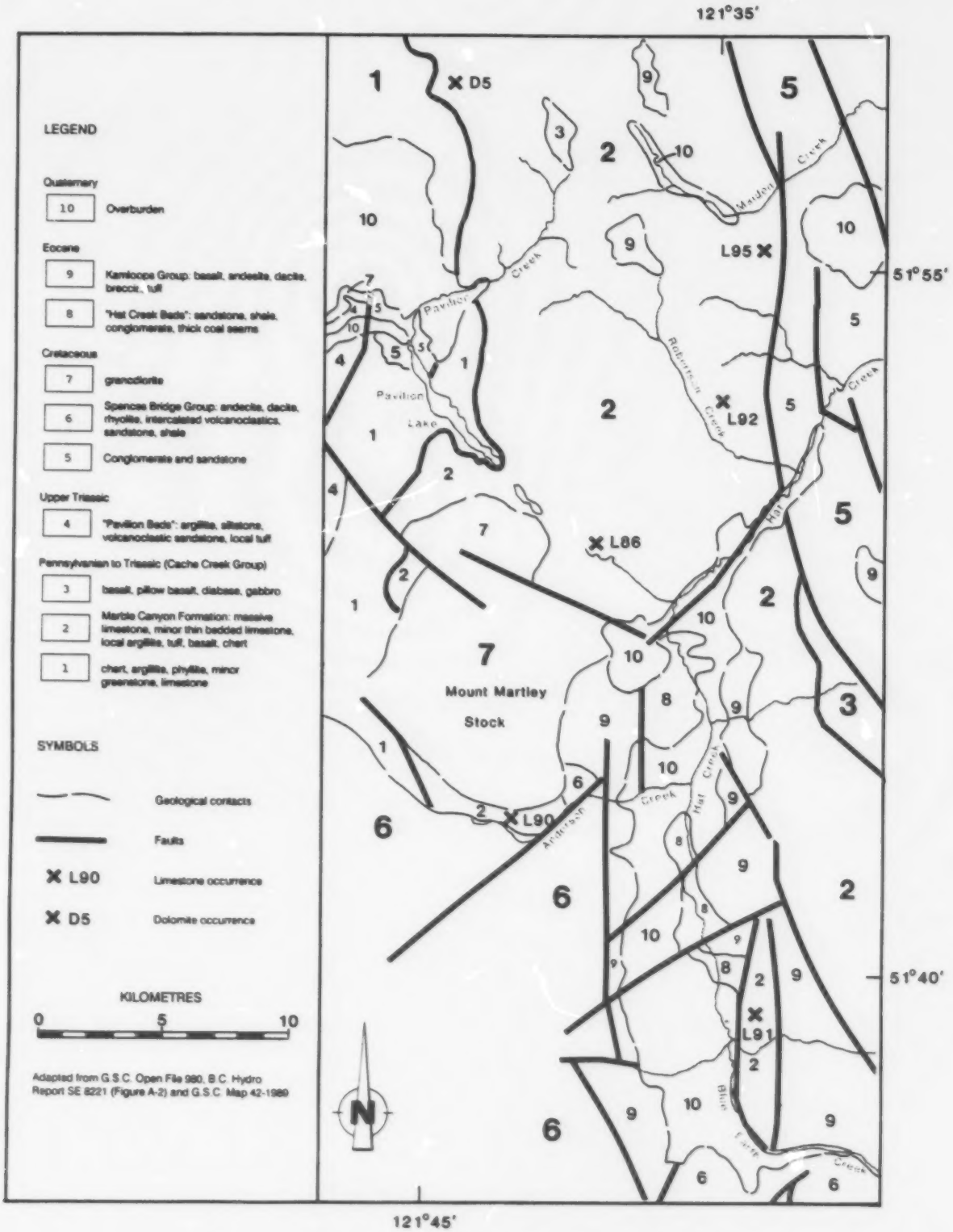

Figure 9. Geology of Marble range, Marble Canyon - Hat Creek Area (92I/12, 13).

Carbonates of the Cache Creek Group generally comprise high-purity limestones with uniform composition over considerable widths owing to their massive nature. In a few instances they become dolomitic over narrow widths. Contamination by stringers and nodules of chert is not unusual. The thicker carbonate units contain intercalations of argillite, chert and volcanic rocks.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

British Columbia Hydro and Power Authority (1981): Dolomitization in the Marble Range Limestones near the Hat Creek Project, Preliminary Evaluation of Possible Sites of a Source of Magnesium Limestone; Report SE 8117, in Industrial Mineral File.

British Columbia Hydro and Power Authority (1982): Geology and Sampling of Possible Sorbent Sites for Hat Creek Pressurized Fluidized Bed Combustion Study; Report SE 8221 (revised 1983), in Industrial Mineral File.

Mortimer, N. (1987): Geological Map of Part of 92I/13; Open File 1987-13.

Trettin, H.P. (1961): Geology of the Fraser River Valley between Lillooet and Big Bar Creek; Bulletin 44, pages 13-19.

Geological Survey of Canada:

Aiken, J.D. (1959): Atlin Map-area, British Columbia; Memoir 307, pages 22-23 and accompanying Map 1082A.

Armstrong, J.E. (1949): Fort St. James Map Area, Cassiar and the Coast Districts, British Columbia; Memoir 252.

Campbell, R.B. and Tipper, H.W. (1971): Geology of the Bonaparte Lake Map-area, B.C.; Memoir 363, pages 25-29 and accompanying Map 1278A.

Duffell, S. and McTaggart, K.C. (1952): Ashcroft Map-area, British Columbia; Memoir 262, pages 16, 18 and accompanying Map 1010A.

Gabrielse, H. (1962): Cry Lake, British Columbia; Map 29-1962.

Gabrielse, H., Anderson, R.G., Leaming, S.F., Mansy, J.L., Monger, J.W.H., Thorstad, L. and Tipper, H.W. (1977): Cry Lake; Open File 610.

Gabrielse, H. and Souther, J.G. (1962): Dease Lake, British Columbia; Map 21-1962.

Monger, J.W.H. (1969): Stratigraphy and Structure of Upper Paleozoic Rocks, Northeast Dease Lake Map-area, British Columbia; Paper 68-48 pages 19-24.

Monger, J.W.H. (1975): Upper Paleozoic Rocks of the Atlin Terrane, Northwestern British Columbia and South-central Yukon; Paper 74-47.

Monger, J.W.H. and McMillan, W.J. (1982): Bedrock Geology of Ashcroft (92I) Map Area; Open File 980.

Souther, J.G. (1970): Tulsequah and Juneau, Cassiar District, British Columbia; Map 1262A.

Souther, J.G. (1971): Geology and Mineral Deposits of Tulsequah Map-area; Memoir 362, pages 15-16.

Tipper, H.W. (1961): Prince George, British Columbia; Map 49-1960.

Tipper, H.W. (1963): Taseko Lakes, British Columbia; Map 29-1963.

Tipper, H.W. (1978): Taseko Lakes (92O) Map-area; Open File 534.

Trettin, H.P. (1980): Permian Rocks of the Cache Creek Group in the Marble Range, Clinton Area, British Columbia; Paper 79-17.

Cache Creek Complex

Marble Canyon
(Continental Lime)

NTS: 92I/13E
MINFILE No.: 92INW081 Latitude: 50°49'04"
Map No.: L086 Longitude: 121°39'11"

Limestone for lime manufacturing is quarried in Marble Canyon, 5 kilometres southeast of Pavilion Lake, 23 kilometres west of Cache Creek. The quarry lies on the south end of the Marble Canyon - Big Bar carbonate band (Figure 9). Near the quarry the strata strike 120° and dip steeply southwest.

In the vicinity of Marble Canyon the deposit is composed of mostly light grey to white, fine-grained limestone containing some chert nodules and veinlets of dolomite. Exposures along the Hat Creek valley to the east are light grey to black, fine to medium-grained limestone sporadically veined with quartz and calcite. Patches of chert and dolomite are frequent, especially near the eastern margin of the deposit. An analysis reported by McCammon (1958) is given in Table 16. Current production from the quarry averages 54.1 per cent CaO (96.5 per cent $CaCO_3$), less than 1 per cent MgO, 1 per cent SiO_2 and 1 to 1.5 per cent R_2O_3 (J.M. Jordon, General Manager, 1989, personal communication).

Steel Brothers Canada Ltd. began quarrying limestone in Marble Canyon on Indian Reserve 3 in 1974, to supply an adjacent lime manufacturing plant. The operation was taken over by Continental Lime Ltd. in October, 1988. The company is currently (1990) mining 200 000 tonnes of limestone annually. A total of 1.75 million tonnes has been quarried between 1975 and 1988.

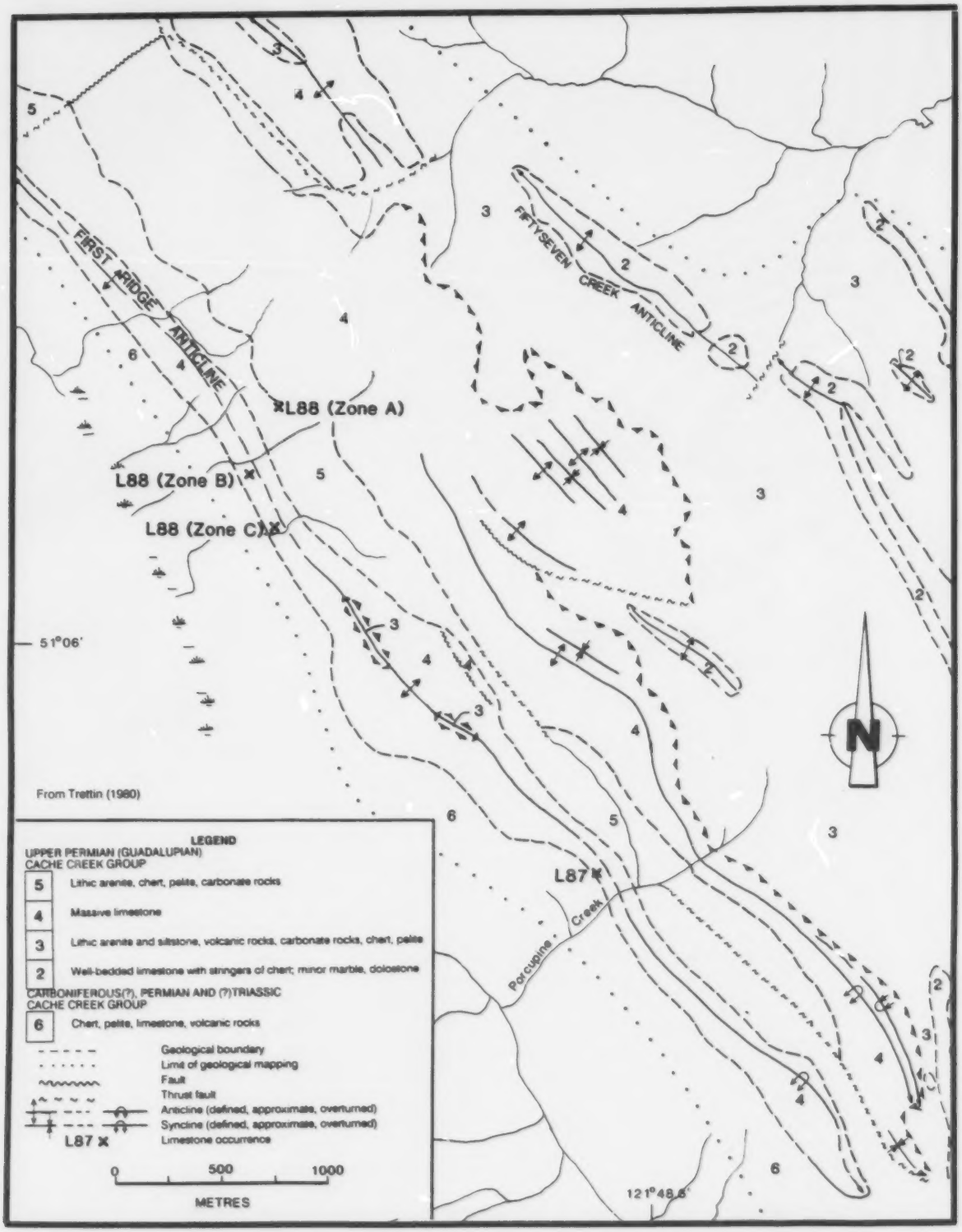

Figure 10. Geology of Marble Range, West of Clinton (92P/04).

TABLE 16
ANALYSES OF MARBLE CANYON LIMESTONES

Deposit	Map No.	ID	CaO %	MgO %	SiO_2 %	Al_2O_3 %	Insol. %	R_2O_3 %	Fe_2O_3 %	MnO %	P_2O_5 %	S %	LOI %	H_2O %
Marble Canyon	L086	1	55.53	0.27			0.08	0.16	0.02	0.009	0.071	nil	43.81	0.02
Jesmond Quarry	L088	2	54.79	0.45			0.88	0.40	0.11	0.004	0.07	0.003	43.42	0.13
		3	55.17	0.27	0.35	0.23			0.08					
		4	55.44		0.10				0.02				44.10	
		5	53.17	0.97	0.96	0.54			0.40			0.05	43.90	
Bowden Creek	L089	6	55.24	0.30			0.46	0.30	0.04	0.030	0.071	trace	43.57	0.03
		7	55.63	0.19	0.48	0.14			0.07			nil		
		8	55.24	0.16			0.30	0.42	0.08	0.04	0.06	0.003	43.83	0.11
							TiO_2*	Na_2O*		K_2O*				
Anderson Crk.	L090	9	51.86	0.57	6.98	0.54	0.23	0.22	0.28	0.02	0.02		40.05	
		10	55.70	0.70	0.26	0.53	0.20	0.33	0.26	0.02	0.02		43.03	
		11	55.21	0.86	0.76	0.62	0.20	0.32	0.20	0.02	0.02		41.94	
White Rock Crk.	L091	12	55.50	0.18	0.26	0.58	0.20	0.02	0.18	0.02	0.02		42.49	
Cornwall Creek	L093	13	55.12	0.31			0.34	0.52	0.03	0.011	0.135	nil	43.55	0.01
Clinton Limst.	L094	14	54.35	1.15			0.34	0.08	0.03	0.025	0.022	trace	44.02	0.04
Pavilion Mtn.	D005	15	33.22	20.44	0.73	0.70			0.26		0.03		46.13	
Maiden Creek	L095	16	53.90	2.45	0.46	0.50			0.11		0.02		43.49	
		17	49.76	4.69	2.78									

Notes

1. *Chip sample across 30 m of limestone exposed in a bluff near the present quarry (McCammon, 1958, p. 92, Sample 6).*
2. *Average of five chip samples taken in succession along a 150 m face (McCammon, 1971, p. 502, Samples 1-5).*
3. *A Zone reserves (Rourke, 1971, pp. 7-9).*
4. *B Zone reserves (Rourke, 1971, pp. 7-9).*
5. *C Zone reserves (Rourke, 1971, pp. 7-9).*
6. *Chip sample across 60 m face of an abandoned quarry (McCammon, 1958, p. 92, Sample 2).*
7. *Chip sample across 46 m of limestone (Goudge, 1944, p. 225, Sample 105).*
8. *Random chip sample from quarry muck-pile (McCammon, 1967, p. 309).*
9. *Average of three bulk samples, Site AC 1 (BC Hydro, 1982, Table 3-1).*
10. *Average of three bulk samples, Site AC 2 (BC Hydro, 1982, Table 3-1).*
11. *Average of three bulk samples, Site AC 3 (BC Hydro, 1982, Table 3-1).*
12. *Sample south of White Rock Creek (BC Hydro, 1982, Table 3-1, Sample 19).*
13. *Chip sample across 150 m of limestone across the top of the south crest (McCammon, 1958, p. 92, Sample 9).*
14. *Random chips across 120 m of limestone exposed in bluffs above the tufa quarry (McCammon, 1958, p. 92, Sample 3).*
15. *Fine-grained dolomite from road-cut (BC Hydro, 1982, Table 3-1, Sample 16).*
16. *Sample of fine-grained limestone (BC Hydro, 1981, Table Addendum 1, Sample 10).*
17. *Sample of fine-grained siliceous limestone (BC Hydro, 1981, Table Addendum 1, Sample 11).*

**TiO_2, Na_2O and K_2O values refer to Samples 9-12 only.*

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1958): Limestone Deposits of the Ashcroft-Clinton Area; Minister of Mines Report, pages 90-93.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 221-222.

Kelley Lake (Columbia Lime) NTS: 92P/04W
MINFILE No.: 92P 171 Latitude: 51°04'52"
Map No.: L087 Longitude: 121°49'07"

A limestone deposit has been investigated in the headwaters of Porcupine Creek, 8.5 kilometres north-northwest of Kelley Lake, 16 kilometres due west of Clinton.

The deposit lies on the west margin of the Marble Canyon - Big Bar carbonate band in the upper limestone member of the Marble Canyon Formation. The member consists of some 200 metres of massive limestone with minor interbedded chert and argillite. The unit is locally folded into a pair of anticlines that form two parallel, closely spaced ridges extending northwestward from Two Mile Creek for between 14 and 15 kilometres. An overlying sequence of argillite, chert and mafic flows is preserved along an intervening syncline in the valley between the two ridges.

Development was focused on the westernmost ridge on the west flank of the First Ridge anticline (Figure 10). The limestone horizon here strikes 145° and dips 65° southwest. The deposit is comprised of massive, grey to white, medium-grained limestone that is commonly cut by a set of vertical joints striking 055°.

Chip sampling and diamond drilling have defined three zones with combined reserves of 38.1 million tonnes at an average grade of 55.2 per cent CaO, 0.33 per cent MgO, 0.19 per cent SiO_2, 0.12 per cent Al_2O_3 and 0.03 per cent Fe_2O_3. (W.G. Wahl Ltd., 1973, pp. 60-63).

Zone A contains 9.59 million tonnes of proven (measured geological) reserves down to the 1585-metre contour. Zone A - Northwest is the northwestward extension of Zone A as suggested by extensive chip sampling. It contains 24.5 million tonnes of possible (inferred) reserves down to the 1585-metre contour. Zone B lies stratigraphically below Zone A, outcropping along its northeast flank. It contains 4.0 million tonnes of probable (indicated) reserves down to the 1585 metre contour.

The property was initially explored by Consolidated African Selection Trust Ltd. under an option agreement with Columbia Lime Products Ltd. A program of chip sampling, 701 metres of diamond drilling and 125 metres of percussion drilling was completed by Selco in 1973 on the south end of District Lot 2203. Consolidated Non-Metallics Ltd. carried out some sampling and stripping up to 1987.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Consolidated Non-Metallics Ltd. (1988): untitled, unpublished report in Industrial Mineral File.

W.G. Wahl Ltd. (1973): Limestone Deposit, Lease D.L. 2203, Clinton, British Columbia; unpublished report in Industrial Mineral File.

Geological Survey of Canada:

Trettin, H.P. (1980): Permian Rocks of the Cache Creek Group in the Marble Range, Clinton Area, British Columbia; Paper 79-17.

Jesmond Quarry
(Ramshead Quarries) NTS: 92P/04W
MINFILE No.: 92P 142 Latitude: 51°07'15"
Map No.: L088 Longitude: 121°51'31"

A quarry face 150 metres long was opened up on Lot 1284 along the east side of the Kostering Creek - Porcupine Creek valley, 14 kilometres northwest of Kelley Lake, 19 kilometres west-northwest of Clinton.

As with the Kelley Lake deposit (L087), 5 kilometres to the southeast, this quarry is developed in the upper member of the Marble Canyon Formation (Unit 4 - Figure 10) which is folded into two anticlines along the western margin of the Marble Canyon - Big Bar carbonate band. At the quarry the limestone is cut by several vertical faults striking 150° to 160°. One of these brings the limestone in contact with a sequence of argillite and conglomerate to the west.

The deposit on Lot 1284 is largely comprised of massive, light grey to dark greyish brown limestone in alternating lighter and darker layers. The quarry exposes massive, fine-grained, light grey to white and grey mottled limestone containing scattered crinoid remains. The rock is contaminated with some thin quartz veinlets and dark chert inclusions just above the quarry face. In thin section the limestone is comprised mostly of calcite with some grains and veinlets of quartz. The average of five analyses reported by McCammon (1971) is given in Table 16.

Reserves totalling 4.14 million tonnes of high and ultrahigh-calcium limestone have been estimated in three zones (Rourke, 1971b, pp. 7-9). Average grades are quoted in Table 16.

Zone A (quarry site), with estimated reserves of 3.6 million tonnes, lies on the west flank of the eastern anticline (west slope of the eastern ridge). Zones B and C lie along the axial trace of the western anticline (First Ridge anticline), on the crest of western ridge. Zone B, with 270 000 tonnes of reserves, is situated 700 metres southwest of zone A, while Zone C, containing 270 000 tonnes of reserves, is situated 1200 metres south of Zone A. The ridge crest between zones B and C is estimated to contain a potential of 36 million tonnes of limestone over a strike length of 600 metres (Rourke, 1971b, p. 9).

The property was initially explored by Jesmond Limestone Corporation and Ramshead Quarries Ltd. in 1970. Malibu Metals Ltd. conducted detailed mapping, sampling and 305 metres of diamond drilling in 1971.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1971): Jesmond Limestone Corporation Quarry; in Geology, Exploration and Mining in British Columbia 1970, pages 501-502.

Rourke, T.A. (1971a): Submission to Malibu Metals Ltd. (N.P.L.), Jesmond Lime Products, Clinton Mining Division, Lillooet Land District; in Industrial Mineral File.

Rourke, T.A. (1971b): Report on the Jesmond Limestone Project of Malibu Metals Ltd. (N.P.L.), Lillooet Land District, Clinton Mining Division; in Industrial Mineral File.

Geological Survey of Canada:

Trettin, H.P. (1980): Permian Rocks of the Cache Creek Group in the Marble Range, Clinton Area, British Columbia; Paper 79-17.

Bowden Creek (Sharan Quarry) NTS: 92P/04E
MINFILE No.: 92P 150 Latitude: 51°02'47"
Map No.: L089 Longitude: 121°41'09"

This deposit is situated on the west side of the Cutoff Valley, 400 metres west of Highway 12 and 8.5 kilometres southwest of Clinton. It is comprised of a limestone bed hosted in a sequence of mafic flows, tuff, chert and argillite 460 metres thick that underlies the Marble Canyon Formation (Trettin, 1980).

The limestone bed strikes 017° over an exposed length of 660 metres and dips vertically. It varies up to 170 metres in exposed width. Several vertical faults cut the deposit.

The bed is comprised of fine-grained, bluish grey and white mottled limestone. Analyses reported by Goudge (1944) and McCammon (1958, 1967) are given in Table 16. The deposit is estimated to contain reserves in excess 900 000 tonnes of high-purity limestone (George Cross News Letter No. 220, 1969).

A small quarry was opened up on this deposit sometime before 1958. Mutual Mining & Refining Ltd. was considering putting the property back into production in 1969.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1958): Limestone Deposits of the Ashcroft-Clinton Area; Minister of Mines Report, pages 90-93.

McCammon, J.W. (1967): Sharan Quarry; Minister of Mines Report, page 309.

Geological Survey of Canada:

Trettin, H.P. (1980): Permian Rocks of the Cache Creek Group in the Marble Range, Clinton Area, British Columbia; Paper 79-17.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 224-225.

Anderson Creek
(Chipuin Mountain) NTS: 92I/12
MINFILE No.: 92INW 097 Latitude: 50°43'06"
Map No.: L090 Longitude: 121°41'48"

Limestone outcrops for 6 kilometres along a westerly trending ridge on the southeastern flank of Chipuin Mountain, 17 kilometres east-northeast of Lillooet. A mass of limestone of the Marble Canyon Formation lies along the south contact of the Mount Martley granodiorite stock (Figure 9), overlain to the south by andesite of the Spences Bridge Group. The limestone generally strikes 135° and dips 35° to 78° southwest near the southern margin of the deposit.

Various outcrops on a steep-sided ridge north of Anderson Creek expose mostly well-bedded, dark grey and less commonly light grey to white, fine-grained, rarely medium to coarse-grained limestone, frequently displaying black or white streaks. The limestone is locally veined by white calcite. Three bulk samples, each roughly 300 kilograms in size, were collected from each of three sites along the top of the ridge by B.C. Hydro. Average analyses are reported in Table 16.

The deposit was mapped and sampled by B.C. Hydro in 1981 and 1982 during a search for dolomite to scrub gases from a proposed coal-fired electrical generating plant.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

British Columbia Hydro and Power Authority (1981): Dolomitization in the Marble Range Limestones near the Hat Creek Project, Preliminary Evaluation of Possible Sites of a Source of Magnesium Limestone; Report SE 8117 addendum, pages 1-3, in Industrial Mineral File.

British Columbia Hydro and Power Authority (1982): Geology and Sampling of Possible Sorbent Sites for Hat Creek Pressurized Fluidized Bed Combustion Study; Report SE 8221 (revised 1983), pages 3-1 and 2, in Industrial Mineral File.

Langley Lake (White Rock Creek) NTS: 92I/12E
MINFILE No.: 92INW098 Latitude: 50°40'35"
Map No.: L091 Longitude: 121°33'51"

An elongate, north-trending, fault-bounded block of Marble Canyon limestone forms a series of bluffs between White Rock Creek and Blue Earth Creek on the east side of the upper Hat Creek valley, 26 kilometres east-southeast of Lillooet (Figure 9). The block is 9.5 kilometres long and up to 1.7 kilometres wide. Bedding strikes 010° to 055° (commonly 25°) and dips 22° to 86° northwest.

Mapping and sampling over the northern half of the block revealed mostly light to dark grey, rarely white or black, massive to bedded, fine to medium-grained limestone, magnesian limestone and dolomite, with variable amounts of white calcite as blebs, veinlets and streaks. Rare beds of quartzite, shale and sedimentary breccia are present within the carbonates and some of the limestone and dolomite is quite siliceous. The analysis of a sample of dark grey, fine-grained limestone taken just south of White Rock Creek near the north end of the block is given in Table 16. Five 20-kilogram bulk samples collected far-

ther south returned the following range in compositions (in per cent) (B.C. Hydro 1982, Addendum, Samples 30 to 35): CaO, 31.77 - 53.32; MgO, 1.91 - 10.59; SiO_2, 2.79 - 27.20; Al_2O_3, 0.02 - 0.03; Fe_2O_3, 0.10 - 0.26; TiO_2, 0.02 - 0.03; Na_2O, 0.02 - 0.10; K_2O, 0.02 - 0.03; P_2O_5, 0.02 - 0.07; L.O.I. 31.96 - 40.18.

This is another of several deposits mapped and sampled by B.C. Hydro between 1981 and 1983 during a search for dolomite in the Hat Creek area to scrub gases from a proposed coal-fired electrical generation plant.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

British Columbia Hydro and Power Authority (1981): Dolomitization in the Marble Range Limestones near the Hat Creek Project, Preliminary Evaluation of Possible Sites of a Source of Magnesium Limestone; Report SE 8117 addendum, pages 1-3, in Industrial Mineral File.

British Columbia Hydro and Power Authority (1982): Geology and Sampling of Possible Sorbent Sites for Hat Creek Pressurized Fluidized Bed Combustion Study; Report SE 8221 (revised 1983), pages 3-1 and 2, in Industrial Mineral File.

Robertson Creek NTS: 92I/13E
MINFILE No.: 92INW099 Latitude: 50°52'05"
Map No. L092 Longitude: 121°34'49"

Limestone outcrops along several low ridges just east of Robertson Creek, 32 kilometres northeast of Lillooet. The deposit lies near the eastern margin of the Marble Canyon - Big Bar carbonate band (Figure 9). The strata are cut by a north-trending fault. Bedding west of the fault strikes 108° to 152° and dips 30° southwest to vertical. To the east bedding strikes 000° to 147° and dips 63° southwest to 76° northwest.

Detailed mapping and sampling over a 1 by 1.5 kilometre area along the ridge tops encountered mostly light grey to dark grey, rarely black or white, fine to medium-grained, commonly massive limestone. Thin-bedded or brecciated limestone with a few irregular zones of light grey, fine to medium-grained dolomite and magnesian limestone up to 7 metres thick is present locally. These zones commonly overly fine-grained thin-bedded limestone strata. The dolomite is siliceous in a few instances. Veins and blebs of white calcite occur sporadically throughout the carbonates. The range and average compositions of ten 20-kilogram samples collected from various outcrops are given in Table 17 (B.C. Hydro 1982, addendum, Samples 20 to 29):

Mapping and sampling were carried out by B.C. Hydro during 1981 and 1983.

TABLE 17
ANALYSES OF BULK SAMPLES FROM ROBERTSON CREEK DEPOSIT

	Range (%)	Average (%)
CaO	44.08 - 55.55	52.02
MgO	1.68 - 9.97	4.09
SiO_2	1.56 - 3.72	2.31
Al_2O_3	0.02 - 0.03	0.02
Fe_2O3	0.09 - 0.14	0.115
TiO_2	0.02 - 0.03	0.02
Na_2O	0.02 - 0.11	0.035
K_2O	0.02 - 0.03	0.02
P_2O_5	0.02 - 0.06	0.027
Ig. Loss	37.29 - 41.98	39.69

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

British Columbia Hydro and Power Authority (1981): Dolomitization in the Marble Range Limestones near the Hat Creek Project, Preliminary Evaluation of Possible Sites of a Source of Magnesium Limestone; Report SE 8117 addendum, page 4, in Industrial Mineral File.

British Columbia Hydro and Power Authority (1982): Geology and Sampling of Possible Sorbent Sites for Hat Creek Pressurized Fluidized Bed Combustion Study; Report SE 8221 (revised 1983), pages 3-4 and 5, addendum 1, pages 1 to 5, in Industrial Mineral File.

Cornwall Creek (Ashcroft) NTS: 92I/11W
MINFILE No.: 92INW 079 Latitude: 50°43'31"
Map No.: L093 Longitude: 121°19'59"

A lens of limestone forms a north-trending, double-crested hill, 400 metres long and 180 metres wide, on the north side of Cornwall Creek, 2.5 kilometres due west of Ashcroft. The lens lies near the eastern margin of the Cache Creek complex, within a melange of chert, argillite, limestone, greenstone and ultramafic blocks of Pennsylvanian to Triassic age. A sequence of shale, argillite and quartzite 46 metres thick, striking 125° and dipping 65° northeast is exposed along the hill's central depression.

The hill is largely underlain by medium-grained, uniform light grey to mottled limestone with a few scattered streaks of chert and some irregular patches of dolomite that are more frequent on the north side of the deposit. Thin films of rusty weathering calcareous shale are also present in the limestone. An analysis reported by McCammon (1958) is given in Table 16.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1958): Limestone Deposits of the Ashcroft-Clinton Area; Minister of Mines Report, pages 91-93.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 183-184.

Clinton Limestone & Tufa NTS: 92P/04E
MINFILE No.: 92P 079 Latitude: 51°04'38"
Map No.: L094 Longitude: 121°38'15"

Limestone of the Marble Canyon Formation outcrops along a series of bluffs on the north side of Cutoff Valley, 4 kilometres southwest of Clinton, near the eastern margin of the Marble Canyon - Big Bar limestone band. A tufa deposit lies 370 metres to the southeast.

The bluffs expose light to dark grey, very fine-grained limestone occasionally contaminated with small chert nodules. An analysis reported by McCammon (1958) is given in Table 16.

This limestone was quarried and burnt in a kiln on site to produce lime, sometime previous to 1944.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1958): Limestone Deposits of the Ashcroft-Clinton Area; Minister of Mines Report, pages 90, 93.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, page 225.

Pavilion Mountain NTS: 92I/13E
MINFILE No.: 92INW101 Latitude: 50°59'15"
Map No.: D005 Longitude: 121°43'59"

Limestone and dolomite are exposed in a road-cut 3850 metres west-northwest of the summit of Pavilion Mountain (Mount Carson), 36 kilometres north-northeast of Lillooet. This showing is situated near the western margin of the Marble Canyon - Big Bar carbonate band (Figure 9). Various exposures along the road-cut and to the north and west show carbonate beds up to 130 metres thick contained in a sequence of massive greenstone, agglomerate, shale, pebbly slate and sandy phyllite. Bedding along the road-cut strikes 157° and dips 76° southwest.

Dolomite and magnesian limestone occur in individual beds up to 2 metres thick lying, between agglomerate and limestone. Along the road-cut half of the exposed carbonate is limestone and limestone breccia, while the remaining half is dolomite breccia. The dolomite breccia is dark grey with angular, black clasts. The limestone is medium to dark grey and commonly medium grained, rarely coarse grained. Some of the limestone breccia contains dolomite clasts. An analysis of fine-grained dolomite from the road-cut is given in Table 16.

B.C. Hydro mapped and sampled the occurrence in 1981.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

British Columbia Hydro and Power Authority (1981): Dolomitization in the Marble Range Limestones near the Hat Creek Project, Preliminary Evaluation of Possible Sites of a Source of Magnesium Limestone; Report SE 8117 addendum, page 4, in Industrial Mineral File.

British Columbia Hydro and Power Authority (1982): Geology and Sampling of Possible Sorbent Sites for Hat Creek Pressurized Fluidized Bed Combustion Study; Report SE 8221 (revised 1983), pages 3-5 and 7, in Industrial Mineral File.

Maiden Creek NTS: 92I/13E
MINFILE No.: 92INW100 Latitude: 50°55'29"
Map No.: L095 Longitude: 121°33'33"

Fine-grained, grey limestone of the Permian Marble Canyon formation outcrops at the north end of a small ridge trending north-northwest in the headwaters of Maiden Creek, 38 kilometres northeast of Lillooet (Figure 9). Bedding is subparallel to the ridge. Three hundred metres farther south along the same ridge the limestone is fine grained, slightly siliceous and magnesian. B.C. Hydro sampled the ridge in 1981. Analyses are given in Table 16.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

British Columbia Hydro and Power Authority (1981): Dolomitization in the Marble Range Limestones near the Hat Creek Project, Preliminary Evaluation of Possible Sites of a Source of Magnesium Limestone; Report SE 8117 addendum, page 3, in Industrial Mineral File.

Stuart Lake Belt

Dahl Lake Quarry NTS: 93G/14W
MINFILE No.: 93G 032 Latitude: 53°47'31"
Map No.: L096 Longitude: 123°17'11"

The Dahl Lake quarry lies near the eastern margin of the Stuart Lake belt, 35 kilometres west-southwest of Prince George. A northwest-trending wedge-shaped area of limestone up to 2.8 kilometres wide and 4.3 kilometres long outcrops along the northeast side of Dahl Lake. The northeast margin of the deposit is faulted against argillite, greywacke and andesitic to basaltic volcanics of the Takla Group. To the west and south the limestone is buried under glacial till. Bedding generally dips steeply west to vertical, although at one point it strikes 125° and dips 71° northeast.

The limestone is black to light grey and medium to fine grained with abundant crinoid remains. In thin section the rock displays a few rounded quartz grains and some thin quartz veinlets. The limestone occasionally contains northwest-trending chert bands up to 0.6 metre thick that sometimes group together to form zones up to 9 metres wide. Cream-coloured masses of magnesian limestone are sometimes present. Analyses of samples taken by McCammon (1970) are given in Table 18.

Limestone has been produced from three quarries just north of Dahl Lake by Kokanee Contracting Limited (Northrock Industries) since 1968, to supply pulp mills in the Prince George area. A total of 527 300 tonnes of limestone had been quarried up to the end of 1988.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1968): Dahl Lake Quarry; Minister of Mines Report, pages 310-311.

McCammon, J.W. (1970): Dahl Lake Quarry; in Geology, Exploration and Mining in British Columbia 1969, pages 393-395.

Vanderhoof NTS: 93G/13
MINFILE No.: 93G 008 Latitude: 53°59'35"
Map No.: L097 Longitude: 123°44'49"

Several outcrops of limestone project above the surrounding cover of fluvioglacial sediments on Lot 5415, 3 kilometres north of the Nechako River and 19 kilometres east-southeast of Vanderhoof. The deposit lies at the western margin of the Stuart Lake belt.

TABLE 18
ANALYSES OF CACHE CREEK LIMESTONES IN THE STUART LAKE BELT

Deposit	Map No.	ID	CaO %	MgO %	SiO_2 %	Al_2O_3 %	Insol. %	R_2O_3 %	Fe_2O_3 %	MnO %	P_2O_5 %	S %	LOI %	H_2O %
Dahl Lake	L096	1	55.03	0.14			0.77	0.15	0.06	trace	0.04	0.003	43.48	0.01
		2	54.49	0.60			0.36	0.13	0.06	trace	0.03	0.002	43.63	0.03
Vanderhoof	L097	3	55.17	0.59	0.44	0.52			0.14		0.01	0.05*	43.00	
Necoslie River	L098	4	54.82	0.24			0.75	0.19	0.10	0.03	0.05	0.003	43.38	0.02
		5	55.22	0.36			0.12	0.25	0.04	trace	0.11	0.001	43.69	0.03
John Claims	L099	6	51.66	0.14			6.42	0.29	0.12	0.06	0.03	0.011	40.78	0.02
Fort St. James	L100	7	54.81	0.93			0.17	0.10	0.06	0.003	0.01	0.002	43.98	0.10
Stuart Lake	L101	8	53.75	0.22			3.30	0.14	0.08	0.05	0.01	0.008	42.52	0.02
Indata Lake	L102	9	51.32	1.38	3.07		3.21	1.56						
		10	55.14	0.07	0.22		0.55	0.14						
Kwanika Creek	L103	11	34.03	17.97			0.38	1.59						
		12	55.41	0.31		0.07	0.15							
Bralorne	L104	13	50.06	0.05	3.04		4.21	0.41						
		14	56.05	0.05	nil		0.19	0.10						
Pinchi Lake	L105	15	55.60	1.62			0.87	0.81						
		16	26.90	12.01	22.75		24.64	0.99						
Vital Creek	L106	17	55.46	0.27	0.11		0.41	0.20						

Notes:

1. *Composite of chips taken at 1.5 m intervals across 33 m of limestone at the top of No. 1 quarry (McCammon, 1970, p. 395, Sample 1).*
2. *Composite of chips taken at 1.5 m intervals across 30 m of limestone at the base of the east wall of No. 2 quarry (McCammon, 1970, p. 395, Sample 2).*
3. *Grab sample from outcrop (Smedley, 1989).*
4. *Composite of chips taken at 60 cm intervals across the 15 m quarry face (McCammon, 1970, p. 392).*
5. *Composite of random chips from outcrop about the quarry (McCammon, 1970, p. 392).*
6. *Composite of random chips along 38 m road-cut (McCammon, 1970, p. 393).*
7. *Composite of random chips from floor of quarry (McCammon, 1968, p. 310).*
8. *Composite of chips taken at 60 cm intervals across the 18 m quarry face (McCammon, 1968, p. 310).*
9. *Grab sample of buff limestone from outcrop on east shore of Indata Lake at its south end (Armstrong, 1949, p. 36, Sample 7).*
10. *Grab sample of blue-grey limestone from outcrop on Limestone Ridge, west of the south end of Indata Lake (Armstrong, 1949, p. 36, Sample 8).*
11. *Grab sample of buff magnesian limestone from outcrop near the Pinchi fault on lower Kwanika Creek (Armstrong, 1949, p. 36, Sample 5).*
12. *Grab sample of limestone from outcrop on a ridge west of Kwanika Creek (Armstrong, 1949, p. 36, Sample 6).*
13. *Grab sample of brecciated buff limestone from the "A" showing at Bralorne mercury mine (Armstrong, 1949, p. 36, Sample 11).*
14. *Grab sample of white limestone from the "A" showing at Bralorne mercury mine (Armstrong, 1949, p. 36, Sample 10).*
15. *Grab sample from outcrop of blue-grey limestone (Armstrong, 1949, p. 36, Sample 2).*
16. *Grab sample of buff limestone containing cinnabar from the glory hole at Pinchi Lake mercury mine (Armstrong, 1949, p. 36, Sample 4).*
17. *Grab sample from outcrop of blue-grey limestone (Armstrong, 1949, p. 36, Sample 14).*

**Value reported under S is SO_3.*

The largest exposure outcrops over a 300 by 140 metre area. Drilling in 1977 indicated the deposit continues to the south and west under a layer of sand and gravel up to 15 metres thick. Together the limestone outcrop and subcrop cover a total area of 400 by 240 metres. Drilling on outcrop has intersected continuous limestone to a vertical depth of at least 35 metres. Bedding strikes north to northeast and dips 80° to vertical.

The deposit is comprised of massive, white to dark grey limestone containing minor quartz veinlets a few millimetres to a few centimetres thick that are randomly distributed throughout the limestone. A few veinlets of yellow carbonate (dolomite ?) are also present. The analysis of a grab sample is reported in Table 18. Samples of cuttings from 25 percussion holes drilled in a 13 by 5.5 metre area on the south side of the main outcrop averaged 53.75 per cent CaO (95.93 per cent $CaCO_3$) and 2.83 per cent SiO_2 (Smedley, 1989). The high silica is reported to be due to surface contamination. The deposit is estimated to contain at least 5 million tonnes of limestone (Smedley, 1989).

This property has been periodically sampled, trenched and drilled by Albert Smedley up to 1988.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Hora, Z.D. (1978): correspondence to A.G. Smedley in Industrial Mineral File.

Smedley, A.G. (1989): correspondence with accompanying maps and assays to P. Fischl in Industrial Mineral File.

Necoslie River NTS: 93K/08E
MINFILE No.: 93K 085 Latitude: 54°23'01"
Map No.: L098 Longitude: 124°07'51"

A mass of limestone forms a ridge 150 metres high extending southeastward for 1.25 kilometres along the north side of the Necoslie River road, 10 kilometres southeast of Fort St. James. The deposit lies along the southwest margin of the western limestone band of the Stuart Lake belt, near its south end.

The limestone is mostly light grey, medium to fine grained and well fractured. Irregular masses of chert 2 to 15 centimetres thick and up to 30 centimetres long are fairly common. An irregular breccia zone is exposed in the quarry. Analyses reported by McCammon (1970) are given in Table 18.

A small amount of limestone was produced from a quarry on the northwest end of the ridge, 100 metres off the road, sometime prior to 1969.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1970): Necoslie River Area; in Geology, Exploration and Mining in British Columbia 1969, page 392.

John Claims (Necoslie River) NTS: 93K/08E
MINFILE No.: 93K 051 Latitude : 54°22'05"
Map No.: L099 Longitude: 124°05'53"

Limestone is exposed for 650 metres along the base of a slope on the northeast side of the Necoslie River road, 13 kilometres southeast of Fort St. James. The deposit lies on the southwest margin of the western limestone band of the Stuart Lake belt, near its south end.

The deposit is comprised mostly of light grey, medium to fine-grained limestone that becomes black in a few places. The rock is cut by white calcite veinlets. A few cherty inclusions are also present. The analysis of a sample collected by McCammon (1970) is given in Table 18.

This deposit was partially stripped and drilled by Domtar Chemicals Inc. between 1968 and 1970.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1970): Necoslie River Area; in Geology, Exploration and Mining in British Columbia 1969, page 393.

Stuart Lake South
(Fort St. James) NTS: 93K/08W
MINFILE No.: 93K 092 Latitude: 54°27'37"
Map No.: L100 Longitude: 124°17'47"

Limestone outcrops over a length of 300 metres on the south side of a knoll 15 metres high on the north shore of Stuart Lake 3.5 kilometres northwest of Fort St. James. The deposit, up to 76 metres wide, is situated on the southwest margin of the western limestone band, which outcrops along the northeast shore of the lake.

The deposit is composed of light to dark grey, very fine grained, well-fractured limestone that is frequently cut by calcite veinlets up to 1.3 centimetres thick. The limestone contains some black and rust-stained cherty argillite lenses. An analysis reported by McCammon (1968) is given in Table 18.

A small amount of limestone was produced from a quarry located 46 metres north of the road that leads to Fort St. James along the north shore of Stuart Lake.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1968): Limestone near Fort St. James; Minister of Mines Report, page 310.

Stuart Lake North NTS: 93K/08W
MINFILE No.: 93K 023 Latitude: 54°28'30"
Map No.: L101 Longitude: 124°19'27"

A small quarry 90 metres northeast of Stuart Lake, 6.3 kilometres northwest of Fort St. James, exposes medium grey, fine-grained, well-fractured limestone with scattered crinoid remains. The deposit lies on the southeast margin of the western limestone band. An analysis reported by McCammon (1968) is given in Table 18.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, W.J. (1968): Limestone near Fort St. James; Minister of Mines report, page 310.

Indata Lake NTS: 93N/06
MINFILE No.: 93N 186 Latitude: 55°17'34"
Map No.: L102 Longitude: 125°15'54"

A mass of limestone outcrops just west of Indata Lake on Limestone Ridge near the south end of the lake, 120 kilometres northwest of Fort St. James. The deposit lies within the eastern limestone band of the Stuart Lake belt, adjacent to the Pinchi fault zone. The belt is approximately 6 kilometres wide in the vicinity of Indata Lake.

The limestone is variably dolomitized along the Pinchi fault due to hydrothermal alteration. Analyses reported by Armstrong (1949) are given in Table 18.

Selected Bibliography

Geological Survey of Canada:

Armstrong, J.E. (1949): Fort St. James Map Area, Cassiar and the Coast Districts, British Columbia; Memoir 252, pages 34-36.

Kwanika Creek NTS: 93N/6E, 11E
MINFILE No.: 93N 187 Latitude: 55°29'47"
Map No.: L103 Longitude: 125°21'15"

A limestone deposit outcrops mostly to the west of Kwanika Creek, just northeast of Tsayta Lake, 135 kilometres northwest of Fort St. James. It lies within the eastern limestone band of the Stuart Lake belt, which is approximately 3.8 kilometres wide along the west side of Kwanika Creek.

Analyses reported by Armstrong (1949) are given in Table 18.

Selected Bibliography

Geological Survey of Canada:

Armstrong, J.E. (1949): Fort St. James Map Area, Cassiar and the Coast Districts, British Columbia; Memoir 252, pages 34-36.

Bralorne NTS: 93N/11W
MINFILE No.: 93N 198 Latitude: 55°34'04"
Map No.: L104 Longitude: 125°23'37"

Limestone outcrops extensively in the vicinity of the Bralorne mercury mine just west of Silver Creek, 145 kilometres northwest of Fort St. James. The deposit is situated within the eastern limestone band adjacent to the Pinchi fault. The belt is up to 2 kilometres wide to the west of Silver Creek, which flows along the fault.

The limestone is variably brecciated and white to blue-grey to buff in colour. Analyses reported by Armstrong (1949) are given in Table 18.

Selected Bibliography

Geological Survey of Canada:

Armstrong, J.E. (1949): Fort St. James Map Area, Cassiar and the Coast Districts, British Columbia; Memoir 252, pages 34-36.

Pinchi Lake NTS: 93K/09W
MINFILE No.: 93K 022 Latitude: 54°37'30"
Map No.: L105 Longitude: 124°24'30"

Various exposures of limestone occur in the vicinity of the Pinchi Lake mercury mine, 25 kilometres northwest of Fort St. James. The limestone is contained in a sequence of chert, argillite and quartzite that outcrops along the northeast side of Pinchi Lake between the western limestone band and the Pinchi fault. It varies from white to blue-grey to buff in colour. Near the Pinchi fault it is variably dolomitic. Analyses reported by Armstrong (1949) are in Table 18.

Selected Bibliography

Geological Survey of Canada:

Armstrong, J.E. (1949): Fort St. James Map Area, Cassiar and the Coast Districts, British Columbia; Memoir 252, pages 34-36.

Vital Creek (BB Claim Group) NTS: 93N/11W
MINFILE No.: 93N 199 Latitude: 55°43'06"
Map No.: L106 Longitude: 125°28'12"

Limestone is exposed on Silver Creek, just north of its confluence with Vital Creek, 160 kilometres northwest of Fort St. James. The deposit lies within the eastern limestone band of the Stuart Lake belt. Locally, the belt varies up to 760 metres in width.

The analysis of a sample of blue-grey limestone reported by Armstrong (1949) is given in Table 18.

Selected Bibliography

Geological Survey of Canada:

Armstrong, J.E. (1949): Fort St. James Map Area, Cassiar and the Coast Districts, British Columbia; Memoir 252, pages 34-36.

Atlin Terrane

Nakina River NTS: 104N/2, 7, 8
MINFILE No.: 104N 094 Latitude: 59°11'00"
Map No.: L107 Longitude: 132°44'00"

Limestone of the Horsefeed Formation underlies an extensive area stretching for 35 kilometres northeastward along the Nakina River and extending for 25 kilometres southeastward from the river to just southwest of Nakina Lake. A few mafic flows and tuffs are present within the limestone. The unit is estimated to be 1500 metres thick in this region. Near Nakina Lake the strata are folded into a series of large, northwest-trending folds.

The formation includes a middle Pennsylvanian to middle Permian limestone member at least 900 metres thick. This unit is composed of pale grey to pale buff-grey, massive, porcelaneous, crinoidal and foraminiferal calcarenite that is rarely dolomitic. Oolites and chert nodules are also quite rare. This member is overlain by 180 metres of well-bedded, pale grey to dark grey, very fine-grained detrital limestone and dolomitic limestone, which is in turn overlain by foraminiferal, calcarenite of Late Permian age.

Selected Bibliography

Geological Survey of Canada:

Monger, J.W.H. (1975): Upper Paleozoic Rocks of the Atlin Terrane, Northwestern British Columbia and South-central Yukon; Paper 74-47, page 17.

Talaha Bay (Tagish Lake) NTS: 104M/16E
MINFILE No.: 104M 033 Latitude: 59°58'29"
Map No.: L108 Longitude: 134°08'07"

Lower Pennsylvanian to Upper Permian limestone of the Horsefeed Formation outcrops over an extensive area surrounding Talaha Bay on Taku Arm. Talaha Bay lies near the western margin of a belt of limestone with minor mafic flows and lithic tuff at least 12 kilometres wide that extends northwestward from Atlin Lake, across Taku Arm of Tagish Lake into the Yukon Territory. The limestone is estimated to be between 900 and 1500 metres thick.

Two distinct carbonate members have been recognized. The most extensive member consists of variably recrystallized, medium to pale grey, massive bioclastic limestone, middle to late Pennsylvanian in age. This limestone is sometimes contaminated with black nodular chert. A less extensive overlying Permian limestone member contains massive, locally thick to medium-bedded, dark grey to black limestone that is rarely dolomitic.

Selected Bibliography

Geological Survey of Canada:

Monger, J.W.H. (1975): Upper Paleozoic Rocks of the Atlin Terrane, Northwestern British Columbia and South-central Yukon; Paper 74-47, pages 27-28.

French Range NTS: 104J/9, 10, 16
MINFILE No.: 104J 042 Latitude: 58°40'00"
Map No.: L109 Longitude: 130°35'20"

Various parallel bands of limestone of the Teslin Formation extend west-northwest from Little Dease Creek and Killarney Creek, along the French Range, west of Dease Lake. The bands are the result of repeated folding of the Teslin Formation and underlying greenstones and pyroclastics of the French Range Formation. The most significant band outcrops for 30 kilometres northwestward to the Tuya River, along the west limb of a syncline. The limestone unit is estimated to be at least 300 metres thick.

The bands are generally composed of fine to medium-grained, massive to bedded, dark grey limestone that has undergone variable amounts of dolomitization and minor silicification. Some silica nodules and thin chert layers (less than 1 centimetre) are present.

Rare argillite interbeds also occur. The limestone becomes tuffaceous at the contact with the underlying French Range Formation.

Selected Bibliography

Geological Survey of Canada:

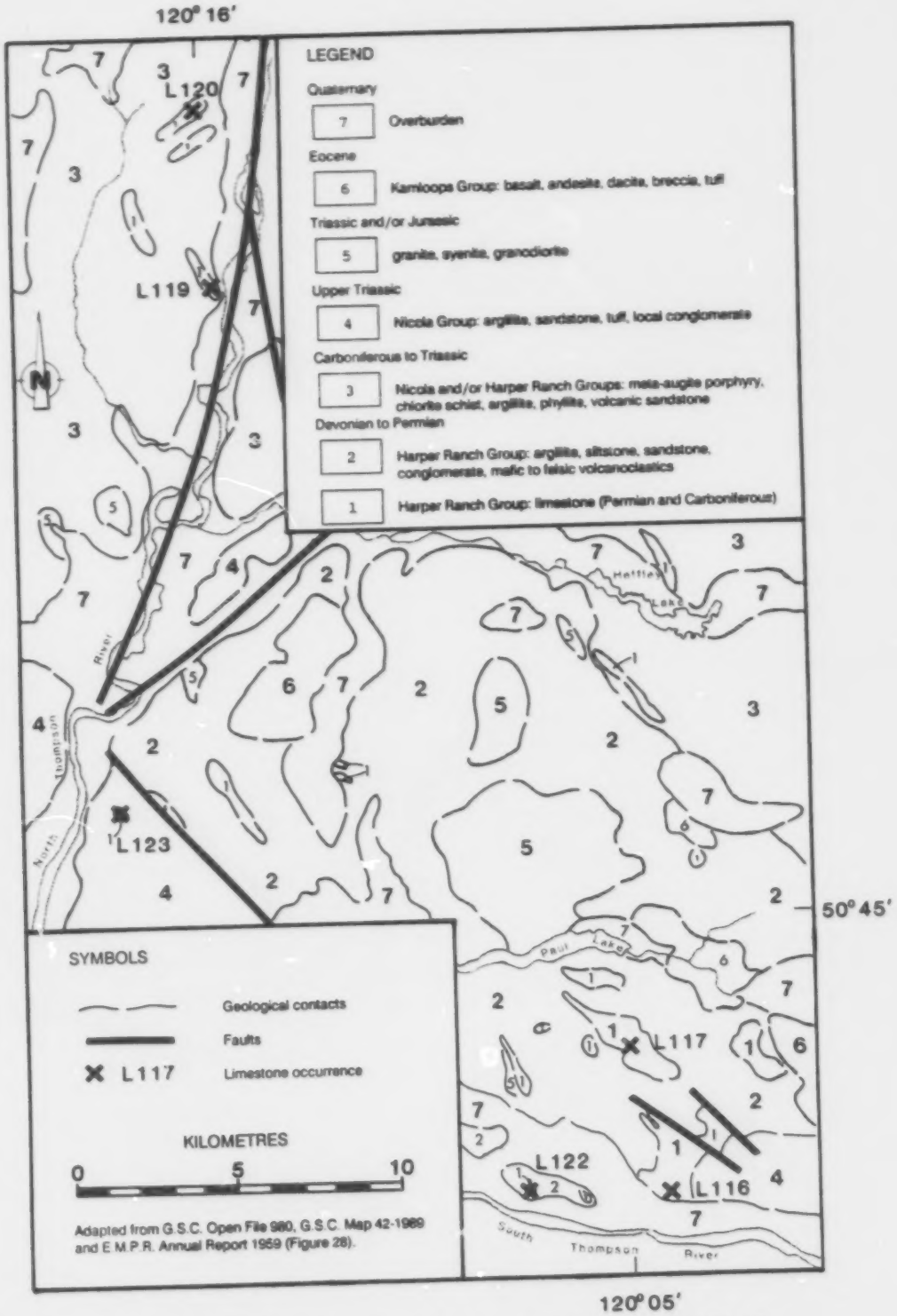

Figure 11. Geology of the Harper Ranch Area, Northeast of Kamloops (92I/09, 16).

Monger, J.W.H. (1969): Stratigraphy and Structure of Upper Paleozoic Rocks, Northeast Dease Lake Map-area, British Columbia; Paper 68-48, pages 19-24.

Monger, J.W.H. (1975): Upper Paleozoic Rocks of the Atlin Terrane, Northwestern British Columbia and South-central Yukon; Paper 74-47, page 5.

Teslin Lake NTS: 104N/15, 16W
MINFILE No.: 104N 097 Latitude: 59°50'35"
Map No.: L110 Longitude: 132°25'05"

Limestone of the Teslin Formation forms several prominent, northwest-trending ridges between Teslin and Gladys lakes. The limestone and the enclosing, less resistant chert, argillite and mafic flows of the Kedahda and French Range formations are warped into a series of northwest-trending folds with near-vertical axial surfaces. The limestone is up to 300 metres thick. The most prominent limestone band extends northwest from Snowdon Creek along the northeast side of Hall Creek for 25 kilometres, varying up to 3.8 kilometres in exposed width. A second band, 13 kilometres long, outcrops 9 kilometres southwest, between Hall and Gladys lakes.

The formation consists of a basal section of brown to buff-weathering, tuffaceous calcarenite that is overlain by dark calcarenite and coquina containing shell fragments and foraminifera, with a few chert nodules, in a fine lime-mud matrix. Pale grey weathering, dark grey to black, massive limestone is the youngest member of the formation.

Selected Bibliography

Geological Survey of Canada:

Monger, J.W.H. (1975): Upper Paleozoic Rocks of the Atlin Terrane, Northwestern British Columbia and South-central Yukon; Paper 74-47, page 11.

Nahlin River (Opal Lake) NTS: 104J/13W
MINFILE No.: 104J 045 Latitude: 58°48'21"
Map No.: L111 Longitude: 131°51'21"

A fault-bounded band of Lower Permian limestone of the Horsefeed Formation extends 12.5 kilometres northwestward from Opal Lake to Chastot Creek, east of Nahlin River. The band widens northwestward from 300 metres to 2300 metres. A narrow band of chert of the Kedahda Formation, 6 kilometres long, is infaulted within the limestone band near its southwest margin.

The deposit largely consists of pale grey weathering, pale to medium grey, massive, unsorted limestone breccia containing angular fragments up to 5 centimetres in length. The fragments are comprised of various carbonates including pale brownish grey, porcelaneous limestone, fusiliferous, calcarenite and fine-grained, black limestone. The limestone is recrystallized in places and heavily veined with calcite.

Selected Bibliography

Geological Survey of Canada:

Monger, J.W.H. (1975): Upper Paleozoic Rocks of the Atlin Terrane, Northwestern British Columbia and South-central Yukon; Paper 74-47, page 13-14.

HARPER RANCH GROUP

The Harper Ranch Group is comprised of a sequence of argillite, sandstone, conglomerate, chert and volcanic flows and clastics of Devonian to Triassic age containing limestone lenses of Mississippian to Late Permian age. The group was initially mapped as the Cache Creek Group (Cockfield, 1948; Jones, 1959) and later referred to as the Thompson assemblage (Okulitch, 1979), before being renamed the Harper Ranch Group (Monger, 1982, p. 294). The group is overlain by volcanics and sediments of the Upper Triassic Nicola Group. A few granitic stocks of Triassic to Jurassic age have intruded the Harper Ranch Group.

The carbonate lenses occur sporadically along a discontinuous belt, consisting mostly of argillite and sandstone and divisible into two segments. The first extends westward from Mount Monashee to Okanagan Lake at Vernon (Mount Monashee - Okanagan Lake segment). The belt continues northwestward for 100 kilometres to the Jamieson Range, crossing the North and South Thompson Rivers (Okanagan Lake - Jamieson Range segment). This segment lies under an extensive cover of Eocene lavas of the Kamloops Group between Okanagan Lake and the South Thompson River. The carbonate lenses vary considerably in size and abundance along the belt. A number of large masses varying up to 3 kilometres in length outcrop on Harper Ranch between Paul Lake and the South Thompson River (Figure 11).

The various lenses are generally composed of white to grey, light bluish grey to light buff-yellow weathering, fine-grained, massive limestone that is sometimes interbedded with the enclosing sediments. The limestone is argillaceous in a few instances. Beds and nodules of chert are a frequent contaminant. Some of the larger lenses contain chert-free sections of extreme purity over moderate widths.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Meyers, R.H., Taylor, W.A. and Tempelman-Kluit, D. (1989): Lode Gold-Silver Occurrences of the Okanagan Region, Open File 1989-5.

Geological Survey of Canada:

Cockfield, W.E. (1948): Geology and Mineral Deposits of Nicola Map-area, British Columbia; Memoir 249, page 7 and accompanying Map 886A.

Jones, A.G. (1959): Vernon Map-area, British Columbia; Memoir 296, page 42 and accompanying Map 1059A [Vernon, British Columbia; Rice, H.M.A. and Jones, A.G. (1960)].

Monger, J.W.H. (1982): Geology of Ashcroft Map-area, Southwestern British Columbia; in Report of Activities, Paper 82-1A, pages 293-297.

Monger, J.W.H. and McMillan, W.J. (1982): Bedrock Geology of Ashcroft (92I) Map Area; Open File 980.

Okulitch, A.V. and Campbell, R.B. (1979): Lithology, Stratigraphy, Structure and Mineral Occurrences of the Thompson-Shuswap-Okanagan Area, British Columbia; Open File 637.

Orchard, M.J. and Forster, P.J.L. (1988): Permian Conodont Biostratigraphy of the Harper Ranch Beds near Kamloops, South-central British Columbia; Paper 88-8, page 2.

Mount Monashee - Okanagan Lake Segment

Camel's Hump
(Creighton Valley) NTS: 82L/02W
MINFILE No.: 82LSE050 Latitude: 50°13'47"
Map No.: L112 Longitude: 118°52'41"

A band of Permian limestone extends northwestward for 4.8 kilometres along the southwest side of Camel's Hump, an elongate hill located 7.5 kilometres east-southeast of Lumby. The band averages greater than 800 metres in width. The limestone is bounded by sandstone and argillite to the southwest and volcanic flows to the northeast. Bedding strikes 102° to 112° and dips 45° to 70° south.

The band consists of medium to fine-grained, light to dark grey limestone containing some argillaceous streaks and inclusions of black chert. The rock is occasionally brecciated and healed with white calcite. An analysis reported by McCammon (1961) is given in Table 19.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1961): Limestone in the Vernon Area; Minister of Mines Report, pages 145-148.

Creighton Valley (Lumby) NTS: 82L/02W
MINFILE No.: 82LSE058 Latitude: 50°12'25"
Map No.: L113 Longitude: 118°54'02"

A lens of Permian limestone 180 metres wide trends 1.6 kilometres southwestward from Creighton Valley, 6.4 kilometres southeast of Lumby. The lens is situated within the central part of the Mount Monashee - Okanagan Lake segment.

The lens contains medium to fine-grained, light grey to white, highly fractured limestone with discontinuous lenses of white chert and veinlets of white quartz. An analysis reported by McCammon (1961) is given in Table 19.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1961): Limestone in the Vernon Area; Minister of Mines Report, pages 145-148.

Vernon NTS: 82L/06W
MINFILE No.: 82LSW097 Latitude: 50°15'24"
Map No.: L114 Longitude: 119°18'33"

Two masses of Permian limestone are exposed 4 to 7.6 kilometres due west of Vernon, north of the road to Okanagan Lake on the west end of the Mount Monashee - Okanagan Lake segment.

The eastern limestone lens outcrops over a roughly circular area 800 metres in diameter. The mass is composed of medium to dark grey, medium-grained limestone with veinlets and lenses of white quartz and calcite. An analysis reported by McCammon (1961) is in Table 19. This limestone was once burnt for lime by the City of Vernon for its sewage treatment plant but this stopped sometime before 1961 because of the poor quality of the stone.

The second lens up to 400 metres wide, outcrops 1.3 kilometres farther west, extending 3.3 kilometres northwest from the Okanagan Lake road. The deposit is composed of thin beds of medium to fine-grained, dark grey limestone interbedded with ribbon chert and cut by white quartz veins. The beds strike 110° and dip 50° south.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1961): Limestone in the Vernon Area; Minister of Mines Report, pages 145-148.

TABLE 19
ANALYSES OF HARPER RANCH LIMESTONES

Deposit	Map No.	ID	CaO %	MgO %	SiO_2 %	Al_2O_3 %	Insol. %	R_2O_3 %	Fe_2O_3 %	MnO %	P_2O_5 %	S %	LOI %	H_2O %
Camel's Hump	L112	1	52.16	0.48			3.84	0.82	0.50	0.07	0.03	0.01	42.05	0.13
Creighton Valley	L113	2	53.07	0.26			4.02	0.30	0.26	0.040	0.02	trace	42.16	0.10
Vernon	L114	3	49.92	2.16			5.14	1.00	0.62	0.07	0.05	0.01	41.68	0.07
Monashee Pass	L115	4	49.55	1.99			5.79	1.84	0.83	0.04	0.01	trace	40.37	0.20
Harper Ranch	L116	5	55.04	0.46	0.42	0.09			0.07			nil		
Mount Harper	L117	6	51.00	1.22			5.38	0.44	0.34	0.013	0.019	0.01	41.76	0.06
Westwold	L118	7	54.68	0.34			0.79	0.18	0.08	0.01	0.02	0.004	43.62	0.02
Black Pines	L119	8	53.21	0.30			3.74	0.28	0.26	0.016	0.01	trace	42.36	nil
		9	52.21	0.10			5.62	0.30	0.30	0.026	0.01	nil	41.53	0.03
		10	49.09	0.23			11.08	0.28	0.26	0.027	0.008	trace	39.14	0.15
Jamieson Range	L120	11	54.54	0.08			1.70	0.18	0.10	0.025	0.017	nil	43.28	0.03
Salmon R. North	L121	12	50.13	1.56			6.50	0.28	0.24	0.04	0.02	0.03	41.32	0.10
South Thompson R.	L122	13	54.65	trace	2.2								42.63	
		14	46.62	trace	14.7								36.38	
		15	53.24	trace	5.1								41.54	
Rayliegh South	L123	16	46.82	0.39			15.04	0.52	0.33	0.015	0.012	trace	37.16	0.05
		17	53.89	0.14	2.98	0.37			0.21		0.01	0.01		
Salmon R. South	L124	18	39.76	0.82			25.26	1.26	0.97	0.04	0.03	0.06	32.61	0.13

Notes

1. *Composite of random chips from the limestone band (McCammon, 1961, p. 148, Sample 10).*
2. *Composite of random chips from the limestone lens (McCammon, 1961, p. 148, Sample 11).*
3. *Composite of random chips from an outcrop of limestone (McCammon, 1961, p. 148, Sample 6).*
4. *Composite of chips taken at 3 m intervals across 60 m at the south end of the bluffs (McCammon, 1961, p. 148, Sample 12).*
5. *Chip sample across 90 m of purer limestone northeast of the quarry (Goudge, 1944, p. 184, Sample 49).*
6. *Composite of random chips along the southern edge of the south lens (McCammon, 1959, p. 170, Sample 3).*
7. *Composite of random chips from the spoil pile of a trench along the crest of the knoll (McCammon, 1968, p. 322, Sample 1).*
8. *Chip sample taken across 122 m of limestone along the road exposure, starting at the northeast edge (McCammon, 1959, p. 170, Sample 5).*
9. *Chip sample taken across 122 m of limestone along the road exposure, following the previous sample (McCammon, 1959, p. 170, Sample 5A).*
10. *Chip sample taken across 91 m of limestone along the road exposure, following the previous sample (McCammon, 1959, p. 170, Sample 5B).*
11. *Chip sample taken across 150 m at the base of the bluff on the northern lens (McCammon, 1959, p. 170, Sample 6).*
12. *Composite of random chips from along the exposure (McCammon, 1961, p. 148, Sample 1).*
13. *Chip sample across 21 m at the base of the outcrop on the west side (McCammon, 1959, p. 170, Sample 1).*
14. *Chip sample across a 6 m cherty zone in the centre of the outcrop (McCammon, 1959, p. 170, Sample 1A).*
15. *Chip sample across 24 m at the base of the outcrop on the east side (McCammon, 1959, p. 170, Sample 1B).*
16. *Chip sample across 46 m at west end of southern lens (McCammon, 1959, p. 170, Sample 4).*
17. *Sample from northern lens (Goudge, 1944, p. 217, Sample 940).*
18. *Sample across 60 m of limestone exposed in road-cut (McCammon, 1961, p. 148, Sample 2).*

Monashee Pass NTS: 82L/02E
MINFILE No.: 82LSE049 Latitude: 50°06'29"
Map No.: L115 Longitude: 118°30'33"

A mass of Permian limestone outcrops for 300 metres in cliffs 50 metres high along the crest of a ridge on the west side of Highway 6, 17 kilometres south-southeast of Cherryville. It is bounded to the south by medium to coarse-grained hornblende biotite granite and to the north by greywacke. The mass lies near the east end of the Mount Monashee - Okanagan Lake segment. Bedding strikes 108° and dips 65° south.

The limestone is medium to fine grained, medium grey to white, massive to bedded and strongly jointed. Chert is quite common, occurring as rusty stringers and as contorted bands 15 to 20 centimetres thick. An analysis reported by McCammon (1961) is given in Table 19.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1961): Limestone in the Vernon Area; Minister of Mines Report, page 148.

Schmidt, U. and Watson, I.M. (1983): Geochemical and Geological Report on the Bud, Moonbeam, Mort and Withrow Claims; Assessment Report 11789, page 4.

Okanagan Lake - Jamieson Range Segment

Lafarge Canada (Harper Ranch) NTS: 92I/09E
MINFILE No.: 92INE001 Latitude: 50°40'15"
Map No.: L116 Longitude: 120°03'56"

An irregular, north-trending mass of Permo-Carboniferous limestone, 3 kilometres in length and up to 2.5 kilometres in width, outcrops on the north side of the South Thompson River, 18 kilometres east of Kamloops (Figure 11). The limestone mass lies along the crest of an anticline plunging 20° south. Bedding on the east limb of the fold strikes 020° and dips 40° east. Conodont sampling in a quarry on the south end of the deposit shows the limestone can be subdivided into at least two sequences, dipping 50° to 80° southeast, that are repeated by a fault on the west margin of the quarry. The quarry exposes a

number of basaltic and lamprophyric dikes 0.15 to 3.0 metres wide, striking 090° and dipping 70° north.

The mass is made up of fine to medium-grained, light to dark grey limestone with abundant white to grey chert as nodules, irregular patches up to 0 6 metre wide and as discontinuous bands 0.1 to 0.6 metre thick. The chert is more frequent near the margins of the deposit. A central zone 60 to 90 metres wide is relatively free of chert. Quartz occurs as fine, silty aggregates that form up to 50 per cent of the rock. The limestone in the quarry is usually veined with iron carbonate and cut by faults containing hydrous iron oxides. The rock is commonly siliceous. In places the limestone grades up to 53.2 per cent CaO (95 per cent $CaCO_3$) within the quarry (John Wong, Chief Chemist, 1989, personal communication). An analysis reported by Goudge (1944) is given in Table 19.

Lafarge Canada Inc. began quarrying the south end of the deposit in 1970 to supply an adjacent cement plant. Up to 1988, 3.6 million tonnes of limestone had been quarried. Remaining reserves are estimated at 80 to 100 years supply at a current production rate of approximately 160 000 tonnes a year (John Wong, 1989, personal communication).

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1950): Report on Limestone on the North Bank of the South Thompson River about 10 Miles east of Kamloops; in Industrial Mineral File, pages 2-5.

McCammon, J.W. (1959): Limestone in the Kamloops Area; Minister of Mines Report, pages 167-170.

McCammon, J.W. and Waterland, T.M. (1966): Harper Ranch Quarry; Minister of Mines Report, page 267.

White, G.P.E.: undated notes on rocks east of Kamloops near the cement quarry, in Industrial Mineral File.

Geological Survey of Canada:

Orchard, M.J. and Forster, P.J.L. (1988): Permian Conodont Biostratigraphy of the Harper Ranch Beds near Kamloops, South-central British Columbia; Paper 88-8, pages 2-3.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, page 184.

Mount Harper NTS: 92I/09E
MINFILE No.: 92INE174 Latitude: 50°42'48"
Map No.: L117 Longitude: 120°05'50"

Two large and several smaller lenses of Permian limestone extend 2.1 to 4.5 kilometres west-northwest on Mount Harper, south of Paul Lake, 13 kilometres east-northeast of Kamloops (Figure 11). The lenses are exposed over widths of up to 1250 metres. They are composed of light to dark grey, fine to medium grained limestone with variable amounts of chert as nodules and discontinuous thin bands. The chert is largely confined to the edges of the deposits. An analysis reported by McCammon (1959) is in Table 19.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1959): Limestone in the Kamloops Area; Minister of Mines Report, pages 168, 170.

Westwold (Annis Industries) NTS: 82L/05W
MINFILE No.: 82LSW049 Latitude: 50°26'48"
Map No.: L118 Longitude: 119°49'23"

A mass of Permian limestone, 2000 metres long, forms a north-trending knoll 180 metres long and up to 75 metres wide on the west side of the Salmon River valley, 5.8 kilometres west-southwest of Westwold. The limestone is in contact with granodiorite to the north and grades into a zone of skarn and quartzite to the south. Bedding strikes 150° and dips 30° southwest.

The deposit consists of medium to coarse-grained limestone (marble) containing grains up to 6 millimetres in diameter. It is mostly white, with some yellow staining on fractures. Small grains and irregular patches of quartz are visible in thin section. An analysis reported by McCammon (1968) is given in Table 19.

The deposit was put into production in 1968 by Annis Industries Ltd. Between 1968 and 1970 a total of 4810 tonnes of limestone was produced for stucco dash, roof rock, riprap and driveway rock.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1968): Annis Industries Ltd.; Minister of Mines Report, page 322.

Black Pines (McLean's Quarry) NTS: 92I/16W
MINFILE No.: 92INE175 Latitude: 50°55'24"
Map No.: L119 Longitude: 120°15'45"

A steeply dipping lens of Late Mississippian limestone, 300 metres thick, outcrops on the west side of the North Thompson River, 3 kilometres south of Black Pines, and continues northwestward up the valley side for 1800 metres (Figure 11). The lens is exposed for a width of 500 metres along a road following the west bank of the North Thompson River.

The deposit consists mostly of massive, soft and brittle, white to light bluish grey, sugary textured limestone cut by numerous calcite veinlets. It contains some thin shale interbeds, especially along its southwest margin. Analyses reported by McCammon (1959) are in Table 19.

The limestone was quarried and burnt in a pot kiln on site to produce lime up to 1911.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1959): Limestone in the Kamloops Area; Minister of Mines Report, pages 168-170.

Brewer, W.M. (1913): McLean's Limestone-quarry; Minister of Mines Report, page 216.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 216-217.

Jamieson Range (Black Pines) NTS: 92I/16W
MINFILE No.: 92INE161 Latitude: 50°59'12"
Map No.: L120 Longitude: 120°16'19"

Two parallel northeast-trending limestone lenses, 770 metres apart, each 1.8 kilometres long, outcrop as two cliffs along the east flank of the Jamieson Range, 2.5 kilometres northwest of Black Pines (Figure 11). The lenses lie on the north end of the Okanagan Lake - Jamieson Range segment. They are made up of light grey to white, medium to fine-grained limestone with scattered patches of chert. An analysis reported by McCammon (1959) is given in Table 19.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1959): Limestone in the Kamloops Area; Minister of Mines Report, pages 169-170.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, page 216.

Salmon River - North Side NTS: 82L/05E
MINFILE No.: 82LSW095 Latitude: 50°28'55"
Map No.: L121 Longitude: 119°41'05"

A vertically dipping lens of light grey, thinly to thickly bedded, Permian limestone strikes northwest for 1200 metres along the north side of the Salmon River valley, 9.6 kilometres west-southwest of Falkland. The lens varies up to 150 metres in thickness. The limestone contains irregular zones and patches of light-coloured chert with quartz and argillaceous material. An analysis reported by McCammon (1961) is in Table 19.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1961): Limestone in the Vernon Area; Minister of Mines Report, pages 144-145, 148.

South Thompson River (Harper Ranch) NTS: 92I/09E
MINFILE No.: 92INE173 Latitude: 50°40'20"
Map No.: L122 Longitude: 120°07'43"

A lens of Carboniferous limestone forms a narrow north-trending ridge 230 metres long with an average width of 40 metres, on the north side of the South Thompson River, 14 kilometres east of Kamloops (Figure 11). Indistinct bedding strikes 170° and dips steeply east. The deposit consists of fine-grained, light to dark grey limestone with scattered patches and irregular bands of chert. Analyses reported by McCammon (1959) are in Table 19.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1950): Report on Limestone on the North Bank of the South Thompson River about 10 Miles east of Kamloops; in Industrial Mineral File, pages 1-2.

McCammon, J.W. (1959): Limestone in the Kamloops Area; Minister of Mines Report, pages 167, 170.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, page 184.

Rayleigh South NTS: 92I/16W
MINFILE No.: 92INE160 Latitude: 50°46'42"
Map No.: L123 Longitude: 120°18'19"

Three narrow, closely spaced lenses of Permo-Carboniferous limestone, enclosed in argillite, outcrop on the northwest flank of Dome Hills on the east side of the North Thompson River, 1.6 to 3.2 kilometres south of the community of Rayleigh Mount (Figure 11). The southern lens extends up the mountain side for several hundred metres, averaging 45 metres in width. It is composed of poorly bedded, dark grey, granular fossiliferous limestone with irregularly distributed patches and nodules of chert. An analysis reported by McCammon (1959) is in Table 19.

The northern lens is 30 metres wide and is exposed for 60 metres up the mountain side. It consists of very fine-grained, bluish grey and white, brittle limestone with calcite veins and some irregular patches of pale blue dolomite. An analysis reported by Goudge (1944) is in Table 19. The central lens is of similar dimension of the northern lens.

Two larger lenses trending northwestward for between 1800 and 3100 metres outcrop to the northeast. Limestone was quarried and burnt in a lime kiln on site, some time before 1944.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1959): Limestone in the Kamloops Area; Minister of Mines Report, pages 168-170.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 215, 216.

Salmon River - South Side NTS: 82L/05E
MINFILE No.: 82LSW096 Latitude: 50°27'53"
Map No.: L124 Longitude: 119°40'26"

A band of Permian limestone is exposed for 60 metres along a road-cut and continues for 180 metres southeastward up the south side of the Salmon River valley, 10 kilometres southwest of Falkland. The limestone is faulted, folded, and intruded by narrow, sheared dikes. Bedding generally strikes 152° dips 55° northeast.

The deposit is comprised of black, fine-grained, thinly bedded, impure limestone that is cut by narrow, white calcite veinlets. An analysis reported by McCammon (1961) is in Table 19.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1961): Limestone in the Vernon Area; Minister of Mines Report, pages 144-145, 148.

UNNAMED PERMIAN LIMESTONES

Terrace Area

Significant exposures of limestone of an unnamed formation of Permian age occur in the Terrace area, usually peripheral to granodioritic intrusions of Lower Tertiary age. This may be a result of the intrusions dragging up the enclosing country rock during their emplacement. Two distinct calcareous units resting on massive greenstone have been mapped east of Terrace. A lower member, 300 metres thick, comprises argillaceous limestone with interbedded calcareous mudstone and minor shale conformably underlies an upper unit of pure, massive limestone up to 30 metres in exposed thickness. Southwest of Terrace similar pure limestone is contained within a sequence of argillaceous limestone with interbedded greenstone and quartz-mica schist.

Most of the purer limestone exposures lie east and southeast of Terrace. These include outcrops on the Zymoetz River, on the north side of Mount Thornhill, on Mount Attree and Mount Layton. Other exposures are southwest of Terrace along the Skeena River between Remo and Shames, and south of Terrace west of the airport and west of Lakelse Lake.

The upper member is commonly comprised of white, recrystallized, medium to coarse-grained, massive limestone that is quite pure in places. The unit sometimes contains interbedded clastic sediments or their metamorphic equivalents.

Selected Bibliography

Geological Survey of Canada:

Duffell, S. and Souther, J.G. (1956): Terrace, Coast District, British Columbia; Map 11-1956.

Duffell, S. and Souther, J.G. (1964): Geology of the Terrace Map-area, British Columbia; Memoir 329 (including Map 1136A), pages 14-18, 98.

Woodsworth, G.L., Hill, M.L. and Van Der Heyden, P. (1985): Preliminary Geological Map of Terrace

TABLE 20
ANALYSES OF UNNAMED PERMIAN LIMESTONES

Deposit	Map No.	ID	CaO %	MgO %	SiO_2 %	Al_2O_3 %	Insol. %	R_2O_3 %	Fe_2O_3 %	MnO %	P_2O_5 %	S %	LOI %	H_2O %
Terrace Calcium	L125	1	55.34	0.29			0.34	0.10	0.06	0.01	0.03	0.003	43.49	0.04
Barr Quarry	L126	2	48.9	4.4			2.5		0.35					
		3	53.1	1.6			1.2		0.14					
Cart & Lime cl.	L129	4	52.57*	0.25*			3.05		0.24					

Notes

1. Composite of random chips taken along 460 m of road-cut (McCammon, 1965, p. 265, Sample 3).
2. Chip sample across 9.75 m of white limestone exposed in quarry face (McCammon, 1954, p. 181, Sample 1).
3. Sample across 19.5 m of limestone 67 m northeast of the quarry (McCammon, 1954, p. 181, Sample 4).
4. Average of seven chip samples across widths of 5 to 7.5 m along a 500 m strike length (Equity Silver Mines Ltd., 1989).

**Values are calculated from $CaCO_3$ and $MgCO_3$ analyses.*

(NTS 103I, East Half) Map Area, British Columbia; Open File 1136.

Terrace Calcium Products (Fir Claims)

NTS: 103I/09W
MINFILE No.: 103I 165 Latitude: 54°30'42"
Map No.: L125 Longitude: 128°28'18"

A generally flat-lying body limestone outcrops as a crescent 3 kilometres long and up to a kilometre wide on the top of Copper Mountain (Mount Thornhill), 10 kilometres east-southeast of Terrace. The deposit is underlain by siliceous and slatey argillites, and the entire sequence is intruded by Late Cretaceous granodiorite of the Coast plutonic complex to the southwest. A few bodies of skarn containing quartz and calcite with various calcium silicates occur in the limestone along the intrusive contact.

The limestone is medium to coarse grained and usually white with some grey streaks. An analysis reported by McCammon (1965) is given in Table 20. It was produced from two small quarries near the south end of District Lot 2838 by Terrace Calcium Products Ltd. between 1969 and 1982. The limestone was quarried for building stone and crushed to produce granules and "white sand" for agricultural, decorative and architectural purposes. A total of 2250 tonnes was quarried.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1965): Limestone in the Terrace Area; Minister of Mines Report, pages 264-265.

Barr Quarry (Shames)

NTS: 103I/07W
MINFILE No.: 103I 009 Latitude: 54°25'31"
Map No.: L126 Longitude: 128°53'43"

A sequence of limestones 30 to 120 metres thick extends 3.1 kilometres northeasterly for along the northwest side of the Skeena River, 21 kilometres southwest of Terrace. It is underlain by metamorphic rocks of amphibolite facies and overlain by metamorphosed flows, tuffs and breccias of the Telkwa (?) Formation. The unit strikes 050° to 060° and dips 68° to 80° northwest and is cut by several cross faults. The limestone is extensively fractured and intruded by a few narrow dikes.

The unit is composed of brownish to greenish and bluish grey to white, coarse-grained limestone interbedded with lenses of greenstone and mica schist. Disseminated pyrite and flakes of mica are sometimes present. The quality of the limestone varies considerably from place to place. Analyses reported by McCammon (1954) are given in Table 20.

Limestone was produced from a quarry on Lot 4510, 650 metres northeast of the Shames River between 1953 and 1956 by A.E. Barr to supply the Columbia Cellulose pulp mill at Port Edward. A total of 15 660 tonnes of limestone was quarried.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Anonymous (1965): unpublished map showing workings and sample locations; in Industrial Mineral File.

Brewer, W.M. (1914): Western Canada Portland Cement Company's Property; Minister of Mines Report, page 152.

McCammon, J.W. (1954): Barr Limestone; Minister of Mines Report, pages 180-181.

Geological Survey of Canada:

Duffell, S. and Souther, J.G. (1964): Geology of the Terrace Map-area, British Columbia; Memoir 329, pages 98-99.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, page 218.

Parks, W.A. (1917): Report on the Building and Ornamental Stones of Canada; Report 452, Volume 5, pages 175-177.

Mayner's Fortune (Lakelse Lake)
MINFILE No.: 103I 113
Map No.: L127
NTS: 103I/07E
Latitude: 54°24'34"
Longitude: 128°39'18"

Several isolated blocks of massive limestone outcrop just west of Lakelse Lake, 14 kilometres south-southwest of Terrace. The limestone is usually white, but sometimes a green or bluish grey colour. It is extensively recrystallized and coarse grained in texture. Epidote-garnet skarn zones with minor magnetite and sulphides are locally developed within it.

One block of limestone 30 metres thick extends for 108 metres northeast from the Lakelse River, crossing the Canadian National Railway Kitimat spur line at the 10-mile point. The bed strikes 040° and dips 25° southeast. The block is estimated to contain at least 454 000 tonnes of limestone (Bottoms, 1967, pp. 3, 10). A representative sample assayed 54.0 per cent CaO (96.3 per cent $CaCO_3$) and 1.59 per cent $MgCO_3$ (Bottoms, 1967, p. 10). At least two other deposits of relatively pure limestone outcrop to the southeast.

Cree Lake Mining Ltd. mapped and sampled some of the limestone in 1967, while searching for skarn-hosted metallic mineralization.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Ashton, A. and Bullis, A. (1971): Geochemical, Geophysical and Geological Report on the Gabe, Kenad, Lady Luck and Lucky Fortune Claims; Assessment Report 3585, pages 5-6.

Bottoms, K.P. (1967): Report on the Lady Luck, Mayner's Fortune, Gabe and Lucky Fortune Mineral Claim Groups, Terrace Area, B.C.; unpublished report for Cree Lake Mining Ltd., in Property File.

Dardanelle
MINFILE No.: 103I 197
Map No.: L128
NTS: 103I/08E
Latitude: 54°28'54"
Longitude: 128°12'09"

A northeast-trending band of limestone 5 kilometres long outcrops on both sides of the Zymoetz River, 1 to 5 kilometres west of its confluence with Dardanelle Creek. It is bounded to the north by Jurassic granite and granodiorite and overlain to the south by basaltic to rhyolitic flows, tuff and breccia of the Telkwa Formation. The band is truncated to the northeast and southwest by faults.

The deposit is comprised of a bed of pure white, fossiliferous limestone 15 to 30 metres thick. It is conformably underlain by argillaceous limestone and overlain by 6 to 15 metres of impure limestone with large white fusilinids in a rose-coloured matrix of carbonate and iron oxide. Eight samples of the pure limestone averaged 2.3 per cent in insoluble residues, which contained mica, clay, silt and some quartz grains.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Duffell, S. and Souther, J.G. (1964): Geology of the Terrace Map-area, British Columbia; Memoir 329, pages 15-16.

Babine Lake Area

Permian limestone outcrops west of Babine Lake. Significant exposures occur 6 kilometres west of Granisle and just south of the east end of Fulton Lake.

Selected Bibliography

Geological Survey of Canada:

Hanson, G. (1942): Houston, British Columbia (92L); Map 671A.

Richards, T.A. and Tipper, H.W. (1976): Smithers, British Columbia (92L); Open File 351.

Cart & Lime Claims
MINFILE No.: 93L 306
Map No.: L129
NTS: 93L/16W
Latitude: 54°53'31"
Longitude: 126°18'20"

Limestone outcrops over a 4-kilometre strike length along a north-northwest-trending ridge 6 kilometres west of Granisle. Bedding strikes 153° and dips 45° northwest. The average of seven chip samples taken across widths of 5 to 7.5 metres over a strike length of 500 metres is given in Table 20. One sample containing 46.88 per cent CaO (83.67 per cent $CaCO_3$) and 13.14 per cent insolubles is excluded from the average. The deposit was sampled by Equity Silver Mines Ltd. in 1988 during a search for a local source of limestone for acid neutralization at the company's mine near Houston.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Equity Silver Mines Ltd., (1989): correspondence in Industrial Mineral File.

Permian Limestone - Stikine River Area

Permian limestone outcrops in the Coast Mountains in the general vicinity of the Stikine River. The majority of the exposures are confined to the following four areas from northwest to southeast; east and south of Tatsamenie Lake, along the Chutine River and between its tributaries Triumph and Pendant creeks, along the Scud River and on Mess Creek.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Brown, D.A. and Gunning, M.H. (1989): Geology and Geochemistry of the Scud River Area, Northwestern British Columbia; Open File 1989-7.

Geological Survey of Canada:

Souther, J.G. (1959): Chutine, Cassiar District, British Columbia; Map 7-1959.

Souther, J.G. (1960): Tulsequah, British Columbia, Map 6-1960.

Souther, J.G. (1970): Tulsequah and Juneau, Cassiar District, British Columbia; Map 1262A.

Souther, J.G. (1971): Geology and Mineral Deposits of the Tulsequah Map-area, British Columbia; Memoir 362, pages 15-16.

Souther, J.G. (1972): Telegraph Creek Map-area, British Columbia; Paper 71-44, page 7 and accompanying Map 11-1971.

Souther, J.G. , Brew, D.A. and Okulitch, A.V. (1979): Iskut River, British Columbia, Map 1418A.

Scud River
(Galore Creek) NTS:104G/3W, 4E, 5E
MINFILE No.: 104G 102 Latitude: 57°10'00"
Map No.: L130 Longitude: 131°20'00"

A discontinuous belt of limestone extends 50 kilometres northwestward from the headwaters of Sphaler Creek along the South Scud River to Ambition Mountain. The limestone is also exposed for 15 kilometres northwestward along the Scud River. The unit is estimated to be 800 to 1000 metres thick and has undergone extensive folding and faulting.

The lower 75 metres of the formation is comprised of dark grey, thin-bedded limestone interbedded with pyritic argillite, which grades upward into 350 metres of pale grey to buff, thin to medium-bedded limestone intercalated with amorphous chert. This is followed by 100 metres of tan to very light grey weathering bryozoan limestone that is overlain by at least 300 metres of massive to bedded, white to buff, bioclastic limestone with minor argillite and tuff. This purer limestone is contaminated with some siliceous layers and pods.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Brown, D.A. and Gunning, M.H. (1989): Geology of the Scud River Area, Northwestern British Columbia (104G/5,6); in Geological Fieldwork 1988, Paper 1989-1, pages 252-256.

Jeffery, W.G. (1965): Geology of the Upper Galore Creek; Minister of Mines Report, page 19.

Logan, J.M. and Koyanagi, V.M. (1989): Geology and Mineral Deposits of the Galore Creek Area, Northwestern B.C. (104G/3,4); in Geological Fieldwork 1988, Paper 1989-1, pages 271-273.

HOZAMEEN GROUP

The Hozameen Group is comprised of a succession of argillite, chert and mafic volcanic rocks with minor limestone contained in a fault-bounded belt that extends southward along the east side of the Fraser River into the United States, widening from less than a kilometre at Boston Bar to 16 kilometres in the Cascade Mountains at the U.S. border. The group is reported to contain strata of Permian to Lower Jurassic age, and is therefore considered to be the southerly continuation of the Fergusson Group (Monger and McMillan, 1982).

Limestone generally occurs in lenticular deposits less than 30 metres thick, however, several traceable carbonate units display thicknesses of up to 360 metres. These beds are commonly folded and faulted. Significant outcrops occur at Saddle Rock on the west side of the Fraser River north of Yale; adjacent to Highway 3 on the Sumallo River near its confluence with the Skagit River; on Mount Coulter west of Nicolum Creek; and just west of the Skagit River near the U.S. border.

Selected Bibliography

Geological Survey of Canada:

Monger, J.W.H. (1969): Hope, West Half, British Columbia; Map 12-1969.

Monger, J.W.H. (1989): Hope Map-area, West Half 92H (W1/2), British Columbia; Paper 69-47, pages 3-6.

Monger, J.W.H. (1989): Geology, Hope, British Columbia; Map 41-1989.

Monger, J.W.H. and McMillan, W.J. (1982): Geology of the Ashcroft (92I) Map Area; Open File 980.

Saddle Rock NTS: 92H/11W
MINFILE No.: 92HNW062 Latitude: 49°37'58"
Map No.: L131 Longitude: 121°23'35"

Just south of the Saddle Rock siding of the Canadian Pacific Railway, 7.5 kilometres north-northeast of Yale, a vertically dipping bed of limestone outcrops on the west bank of the Fraser River and continues northwestward up the steep valley side for 250 metres, crossing both the highway and the railway. The bed widens from 15 metres at the river to 24 metres at the railway. The limestone is intruded by granite to the west.

The deposit is largely composed of siliceous, bluish white, fine-grained limestone that is extensively interbedded with quartzite at the river. The band contains a single bed of quartzite at the railway 4.6 metres wide. One hundred and fifty metres northwest of the railway a small quarry exposes pale brownish grey limestone with quartz veins and flakes of mica. An analysis reported by Goudge (1944) is given in Table 21.

During 1937 and 1940 a total of 246 tonnes of limestone was produced by H. Reynolds for agricultural purposes.

Selected Bibliography

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 180-181.

Sumallo River NTS: 92H/03E
MINFILE No.: 92HSW122 Latitude: 49°13'11"
Map No.: L132 Longitude: 121°05'32"

A bed of massive, bluish grey and white limestone 215 metres thick follows the Sumallo River for 3 kilometres northwestward from its confluence with the Skagit River to Highway 3. The unit is underlain by impure limestone, argillite and breccia and overlain by interbedded quartzite and argillite.

Selected Bibliography

Geological Survey of Canada:

Camsell, C. (1911): Geology of the Skagit Valley, Yale District, B.C.; *in* Summary Report for 1911, page 118.

FERGUSSON GROUP (BRIDGE RIVER GROUP)

A thick Permian to Middle Jurassic sequence of thin-bedded chert, argillite, phyllite, basalt, andesite, chloritic schist and amphibolite, subjected to complex folding and faulting, outcrops in the Bralorne - Bridge River area.

Numerous lenticular limestone bodies, commonly trending east-west, are scattered throughout the Fergusson Group. Some are up to 90 metres thick, however, most are not more than 15 metres in thickness. Only a few can be traced for more than a hundred metres along strike.

A number of limestones have been mapped north and south of Carpenter Lake (McCann, 1922) and in the Cadwallader Creek drainage area. One of the most significant exposures occurs near Meade Lake, 3.3 kilometres north of the Pioneer mine, at the foot of Mount Fergusson. Limestone was quarried here for lime during the early 1930s for use at the mine.

The various carbonate masses are comprised of dark grey to bluish grey to white, light grey to buff-weathering, generally medium to coarse-grained limestone. Most of the limestone is extensively veined with recrystallized carbonate. The rock occasionally contains garnet, wollastonite and tremolite, where contact metamorphosed by intrusions.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Church, B.N., Gaba, R.G., Hanna, M.J. and James, D.A.R. (1988): Geologic Reconnaissance of the Bridge River Mining Camp (92J/15,16,10; 92O/02);

TABLE 21
ANALYSES OF HOZAMEEN AND FERGUSSON LIMESTONES

Deposit	Map No.	ID	CaO %	MgO %	SiO_2 %	Al_2O_3 %	Insol. %	R_2O_3 %	Fe_2O_3 %	MnO %	P_2O_5 %	S %	LOI %	H_2O %
Saddle Rock	L131	1	53.44	1.21	1.51	0.21			0.32			trace		
Marshall Ridge	L137	2	54.19*	0.87*	0.46	0.23			0.17					
Piebiter Creek	L13	3	55.00	0.25			1.10	0.04						

Notes

1. Sample from quarry, free of quartz and quartzite (Goudge, 1944, p. 181, Sample 44).
2. Sample of limestone (Drysdale, 1916, p. 53).
3. Chip sample across 22.3 m of limestone (Merrett, 1948, p. 182, Sample 935K).

**Values are calculated from $CaCO_3$ and $MgCO_3$ analyses.*

in Geological Fieldwork 1987, Paper 1988-1, pages 93-100.

Church, B.N. and MacLean, M. (1987): Geology of the Gold Bridge Area (92J/15W); Open File 1987-11.

Church, B.N. and Pettipas, A.R. (1989): Research and Exploration in the Bridge River Mining Camp (92J/15,16); *in* Geological Fieldwork 1988, Paper 1989-1, pages 105-114.

Geological Survey of Canada:

Cairnes, C.E. (1937): Geology and Mineral Deposits of the Bridge River Mining Camp, British Columbia; Memoir 213, pages 11-12, 72-73.

Cairnes, C.E. (1938a): Gun Lake Area; Map 430A.

Cairnes, C.E. (1938b): Cadwallader Creek Area; Map 431A.

McCann, W.S. (1922): Geology and Mineral Deposits of the Bridge River Map Area, British Columbia; Memoir 130, page 23 and accompanying Map 1882 [Lawson, E. and Freeland, E.E. (1918)].

Monger, J.W.H. and McMillan, W.J. (1982): Bedrock Geology of Ashcroft (92I) Map Area; Open File 980.

Monger, J.W.H. and McMillan, W.J. (1989): Ashcroft, British Columbia; Map 42-1989.

Roddick, J.A. and Hutchison, W.W. (1973): Pemberton (East Half) Map-area, British Columbia (92J); Paper 73-17, pages 1-3 and accompanying Map 13-1973.

Marshall Ridge NTS: 92J/15E
MINFILE No.: 92JNE123 Latitude: 50°53'17"
Map No.: L133 Longitude: 122°34'56"

A mass of limestone containing minor chert and argillite outcrops over a 900 by 500 metre area along the southwest slope of Marshall Ridge, 0.5 kilometre north of Carpenter Lake; an analysis is given in Table 21.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Singhai G. (1983): Geological and Geochemical Report on the P 1-2 Claims; Assessment Report 11784.

Geological Survey of Canada:

Drysdale, C.W. (1916): Investigations in British Columbia; in Summary Report for 1916, page 53.

Piebiter Creek NTS: 92J/10E
MINFILE No.: 92JNE143 Latitude: 50°43'21"
Map No.: L134 Longitude: 122°38'54"

A lens of grey to white, fine to coarse-grained limestone 55 metres wide strikes northwest for 275 metres along a hillside 300 metres north of Piebiter Creek, 46 kilometres north-northeast of Pemberton. It dips steeply northwest. A narrow zone of scheelite-chalcopyrite-bearing skarn is developed along the margin of the lens. An analysis is given in Table 21.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Allen, D.G. and Brownlee, D. (1986): Geological, Geochemical, Geophysical and Drilling Report on the Bralorne Extension; Assessment Report 15871.

Merritt, J.E. (1948): Bridge River; Minister of Mines Report, pages 101-102.

Patmore, W. (1955): Geological Report on the Chalco Claim; Assessment Reports 105.

NICOLA GROUP

The Nicola Group comprises a Middle to Upper Triassic sequence of felsic to mafic flows, volcaniclastics and sediments in the southern Intermontane Belt, lying mostly between the Fraser River and Okanagan Lake. It consists of a central volcanic belt bounded to the east and west by sedimentary belts. Limestone is occasionally found in all three belts.

The central belt extends south from Kamloops Lake through Merritt to Princeton. It comprises mostly andesitic to basaltic flows, tuffs and breccias with some interbedded argillite and sandstone. Sporadic limestones occur as lenses and beds of limited extent and thickness. Limestone is unusually common north and west of Aspen Grove, south of Nicola Lake and in the Promontory Hills, northwest of Merritt.

The western belt is characterized by mafic to felsic volcaniclastic rocks intercalated with shale, argillite, conglomerate and sandstone, extending south from Ashcroft to the Tulameen area. Limestone commonly forms lenses or thin beds similar to the central belt.

The eastern belt extends from north of Kamloops south-southeast to Hedley and eastward to Okanagan Lake in the vicinity of Kelowna and Vernon. Much of the eastern belt near Kamloops and Okanagan Lake was initially mapped as Cache Creek Group (Cockfield, 1948; Jones, 1959) and later remapped as the Thompson assemblage (Okulitch and Campbell, 1978), before being included with the Nicola Group (Monger and McMillan, 1982; Tempelman-Kluit, 1989a). The belt is dominated by

sediments ranging from argillite to conglomerate with minor tuff. Limestones characteristically form traceable beds much thicker than those of the other two belts, such as those found northwest of Kelowna and near Hedley.

The Nicola Group carbonates display a wide variation in composition and quality. They are white to black, fine to coarse-grained, variably siliceous limestones commonly contaminated with chert and dolomite and sometimes interbedded with argillite and cut by dikes. The purer limestones seem to be confined to the eastern and western belts.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Meyers, R.H., Taylor, W.A. and Tempelman-Kluit, D. (1989): Lode Gold-Silver Occurrences of the Okanagan Region, Open File 1989-5.

Preto, V.A. (1979): Geology of the Nicola Group Between Merritt and Princeton; Bulletin 69, pages 25-36, 67-68.

Geological Survey of Canada:

Bostock, H.S. (1940): Hedley Area; Map 538A.

Cockfield, W.E. (1948): Geology and Mineral Deposits of Nicola Map-area, British Columbia; Memoir 249, page 7 and accompanying Map 886A.

Duffell, S. and McTaggart, K.C. (1952): Ashcroft Map-area, British Columbia; Memoir 262, pages 29-31 and accompanying Map 1010A.

Jones, A.G. (1959): Vernon Map-area, British Columbia; Memoir 296, pages 38-39 and accompanying Map 1059A [Vernon, British Columbia; Rice, H.M.A. and Jones, A.G. (1960)].

Monger, J.W.H. (1981): Geology of the Western Ashcroft Map Area, Southwest British Columbia; in Report of Activities, Paper 1981-1A, pages 185-189.

Monger, J.W.H. (1982): Geology of Ashcroft Map-area, Southwestern British Columbia; in Report of Activities, Paper 82-1A, pages 293-297.

Monger, J.W.H. (1989): Hope, B.C.; Map 41-1989.

Monger, J.W.H. and McMillan, W.J. (1982): Bedrock Geology of Ashcroft (92I) Map Area; Open File 980.

Okulitch, A.V. and Campbell, R.B. (1979): Lithology, Stratigraphy, Structure and Mineral Occurrences of the Thompson-Shuswap-Okanagan Area, British Columbia; Open File 637.

Rice, H.M.A. (1947): Geology and Mineral Deposits of the Princeton Map-area, British Columbia; Memoir 243, pages 9-15 and accompanying Map 888A.

Tempelman-Kluit, D.J. (1989a): Geology of Penticton, British Columbia; Map 1736A.

Tempelman-Kluit, D.J. (1989b): Geological Map with Mineral Occurrences, Fossil Locations, Radiometric Ages and Gravity Field for Penticton Map Area (NTS 82E), Southern British Columbia; Open File 1969.

Armstrong (Mount Rose) NTS: 82L/06E
MINFILE No.: 82LSW098 Latitude: 50°28'38"
Map No.: L135 Longitude: 119°13'47"

A mass of limestone up to 1000 metres wide extends west-northwest for 4.5 kilometres, 2.5 to 6 kilometres northwest of Armstrong. It lies within argillite of the eastern belt. To the east, bedding strikes approximately 125° and dips 30° southwest and becomes nearly horizontal farther west.

Outcrops of white to pink, bluish grey, and white and grey streaked, fine to coarse-grained, thinly bedded limestone are intensely fractured in a few instances. The limestone commonly contains thin sheet-like inclusions of schist and a few dikes. Muscovite, quartz, pyrite and iron oxides are sometimes present. An analysis reported by Goudge (1944) is given in Table 22.

Diamond drilling in the central part of the limestone mass defined proven (measured geological) reserves of 998 000 tonnes and probable (indicated) reserves of 450 000 tonnes, averaging 55.3 per cent CaO, over an area of 180 by 150 metres to a depth of 15 metres with a cut-off grade of 0.10 per cent Fe_2O_3 (Kerr, 1971, p. 6). Details of reserve grades are given in Table 22.

A small quarry was opened up 4.3 kilometres from Armstrong earlier this century for the manufacture of lime. Mount Rose Mining Co. Ltd. drilled 11 holes in 1970. The company considered developing the deposit to supply limestone to a local glass manufacturer (Consumers Glass) and to Lafarge Canada's cement plant near Kamloops. These plans never materialized and the property was eventually abandoned.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Kerr, J. (1971): Summary Report for Mount Rose Mining Co. Ltd.; unpublished report in Industrial Mineral File.

McCammon, J.W. (1961): Limestone in the Vernon Area; Minister of Mines Report, pages 145-146, 148.

TABLE 22
ANALYSES OF NICOLA, SHOEMAKER AND TAKLA LIMESTONES

Deposit	Map No.	ID	CaO %	MgO %	SiO_2 %	Al_2O_3 %	Insol. %	R_2O_3 %	Fe_2O_3 %	MnO %	P_2O_5 %	S %	LOI %	H_2O %
Armstrong	L135	1	55.04	0.24	1.10	0.23			0.10	Na_2O*	K_2O*	nil		
		2	55.30	0.15		0.20	0.67		0.08	0.04	0.06		43.50	
Hedley	L137	3	52.43	1.37	2.00	0.29			0.29			0.01		
Martel	L138	4	53.68	0.56			2.62	0.50	0.11	0.031	0.031	0.02	42.50	0.11
		5	54.12	0.89			1.34	0.22	0.08	0.036	0.031	0.02	43.38	0.03
Promontory Hills	L139	6	45.92	1.06			13.32	2.84	0.92	0.107	0.042	0.04	36.85	0.08
Harmon Lake	L140	7	54.40	0.23			1.92	0.26	0.12	0.023	0.026	trace	43.08	0.02
Law's Camp	L141	8	53.92	0.39			1.90	0.52	0.32	0.02	0.037	0.008	43.09	0.05
Swakum Mountain	L142	9	48.09	0.63			11.16	1.08	0.67	0.05	0.056	0.02	38.99	0.03
Nicola Lake	L143	10	53.67	0.46			2.62	0.28	0.20	0.015	0.038	0.01	42.8	0.04
Walhachin	L144	11	52.40	0.61			3.76	1.16	0.37	0.543	0.040	0.03	42.01	0.03
Rattlesnake Hill	L145	12	48.00	0.33	11.56	1.38			0.66			trace		
Oialla Creek	L146	13	53.14	0.16			3.65	0.60	0.41	0.13 MnO_2*	0.05	0.008 K_2O*	41.93 Na_2O*	0.01 TiO_2*
Calcite Claims	L147	14	52.74	0.46	2.43	0.50			0.42	0.08	0.04	0.12	0.01	0.04
Beverley	L148	15	52.40	0.35			5.50	0.30	0.11	0.005	0.04	0.08	41.53	0.07

Notes

1. Sample from quarry near east end of deposit (Goudge, 1944, p. 205, Sample 75).
2. Average grade of measured and indicated reserves (Kerr, 1971, p. 7).
3. Chip sample across 9 m limestone bed (Goudge, 1944, p. 202, Sample 58).
4. Chip sample across 46 m of southern lens exposed along road-cut (McCammon, 1958a, p. 92, Sample 10).
5. Composite of random chips across 300 m of northern lens exposed along road-cut (McCammon, 1958a, p. 92, Sample 11).
6. Chip sample across limestone lens 21 m wide exposed over a strike length of 60 m (McCammon, 1958b, p. 96, Sample 3).
7. Composite of random chips across the limestone lens near its centre (McCammon, 1958b, p. 96, Sample 5).
8. Sample across 34 m width of limestone lens 150 m southwest of Liverpool adit (McCammon, 1963, p. 144).
9. Sample across the limestone lens (McCammon, 1958b, p. 96, Sample 2).
10. Composite of random chips (McCammon, 1958b, p. 96, Sample 4).
11. Chip sample along the 60 m length of the lens (McCammon, 1958a, p. 92, Sample 12).
12. Composite of random chips over the main outcrop (Goudge, 1944, p. 184, Sample 48).
13. Chip sample taken at 1.5 m intervals across 45 m of limestone (McCammon, 1968, p. 323).
14. Grab sample from outcrop (Westgarde, 1988).
15. Sample across 30 m of limestone (McCammon, 1957, p. 85).

**Refers only to values immediately following.*

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 204-205.

Bald Range (Blue Claims) NTS: 82L/04, 82E/13
MINFILE No.: 82LSW112 Latitude: 50°02'06"
Map No.: L136 Longitude: 119°33'55"

Limestone outcrops on the east slope of Bald Range, west of Bald Range Creek, 13 kilometres north-northwest of Kelowna. The deposit is comprised of two distinct carbonate horizons contained in a sequence of argillites and tuffs of the eastern belt. On the southern part of the property scattered outcrops and diamond drilling indicate a subvertical limestone bed up to 250 metres thick striking northerly for at least 1300 metres. To the north, an irregular northwest-trending limestone unit of variable width outcrops adjacent a mass of quartz diorite and porphyritic granite.

The two carbonate units consist mostly of fine to medium-grained, recrystallized white limestone (marble) with lesser amounts of grey, black, orange and bronze-coloured limestone. Crinoid fragments are occasionally visible in the rock. The northern deposit is comprised predominantly of white limestone while the southern deposit contains the more colourful limestone. Six surface samples from both units, and five diamond drill core samples from the southern deposit, averaged 54.3 per cent CaO (97 per cent $CaCO_3$) (George Cross News Letter No. 209, 1989). The rock is reported to polish well and display a high brightness. Some of the material has been used for ornamental lapidary products such as bookends and clocks. The strength of four samples collected from a road-cut near the south end of the property ranged from 4.8 to 15.2 kilograms per square metre (3381 to 10708 PSI) (wet) and 2.5 to 11.7 kilograms per square metre (1759 to 8267 PSI) (dry) (Hora, 1984).

The two carbonate units cover an area of some 170 hectares, suggesting the potential for a large tonnage (George Cross News Letter No. 209, 1989).

The southern part of the deposit was initially held and prospected by D. Sandburg between 1982 and 1984 for its marble.

Banbury Gold Mines Ltd. later staked the property during a search for precious metals. The company subsequently focused its exploration effort on the marble, carrying out geological mapping and 335 metres of

diamond drilling during 1988 and 1989. Based on this work the southern deposit is estimated to contain 198 800 tonnes of high- quality marble suitable for polished tile production (Stanford, 1989).

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Hora, Z.D. (1984): correspondence with D. Sandburg, February and October; in Industrial Mineral File.

Stanford, M.R. (1989); A Brief Summary Report on the Blue Claim Group Marble Deposit; in Industrial Mineral File.

Hedley NTS: 92H/08E
MINFILE No.: 92HSE149 Latitude: 49°21'14"
Map No.: L137 Longitude: 120°04'03"

The Sunnyside limestone of the Hedley Formation is 45 to 60 metres thick and outcrops in an arcuate pattern on the west, south and east slopes of Nickel Plate Mountain, east of Hedley. The formation lies within the eastern sedimentary belt.

The Sunnyside limestone member is composed mostly of thin to thick-bedded, light bluish grey, medium-grained limestone that is frequently siliceous and contaminated by chert. A quarry on the west face of Nickel Plate Mountain, just above a granodiorite intrusion, exposes a bed of purer limestone 9 metres thick, underlain by impure limestone intruded by numerous sills and overlain by siliceous limestone with chert nodules. An analysis reported by Goudge (1944) is given in Table 22.

Between 1926 and 1937 a total of 2385 tonnes limestone was quarried 150 metres up the west face of Nickel Plate Mountain to supply lime for the mill at the Hedley gold mine.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Ray, G.E., Simpson, R., Wilkinson, W. and Thomas, P. (1986): Preliminary Report on the Hedley Mapping Project; *in* Geological Fieldwork 1985, Paper 1986-1, pages 101-105.

Ray, G.E., Dawson, G.L. and Simpson, R. (1987): The Geology and Controls of Skarn Mineralization in the Hedley Gold Camp, Southern British Columbia (92H/8, 82E/5); *in* Geological Fieldwork 1986, Paper 1987-1, pages 65-79.

Ray, G.E., Dawson, G.L. and Simpson, R. (1988): Geology, Geochemistry and Metallogenic Zoning in the Hedley Gold-skarn Camp (92H/08, 82E/05); *in* Geological Fieldwork 1987, Paper 1988-1, pages 59-80, 275-277.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 192-193, 202.

Martel NTS: 92I/11W
MINFILE No.: 92INW080 Latitude: 50°30'38"
Map No.: L138 Longitude: 121°17'01"

Two lenses of limestone outcrop on the west side of the Thompson River, north of Martel, 23 kilometres south of Ashcroft, within the western belt. The first lens consists of a triangular mass of limestone exposed over a width of 90 metres in a road-cut along Highway 1, 800 metres north of Martel. The limestone continues northwest of the highway for 120 metres. It is bounded on the west by quartzite and on the northeast by skarn. Indistinct bedding strikes west. The deposit consists mostly of dark grey to black, extensively fractured limestone veined with calcite. Near the northern edge of the lens the limestone is interbedded with argillite. An analysis reported by McCammon (1958a) is given in Table 22.

Three hundred metres to the north a second limestone lens, extensively disrupted by folding and faulting, is exposed in a highway road-cut over a width of 1300 metres. It strikes 155° for 1600 metres and dips southwest. The deposit is comprised of well-fractured uniform-black fine-grained limestone veined with calcite and cut by numerous dikes, which are less frequent to the northwest. A few chert nodules and stringers, and some scattered interbeds of argillite are present. An analysis reported by McCammon (1958a) is given in Table 22.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1958a): Limestone Deposits of the Ashcroft-Clinton Area; Minister of Mines Report, pages 91-93.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 181, 184.

Promontory Hills NTS: 92I/02W
MINFILE No.: 92ISE144 Latitude: 49°15'14"
Map No.: L139 Longitude: 121°01'42"

Several lenticular beds of limestone extend northwestward for up to 6.3 kilometres across the south slope of Promontory Hills, 13 kilometres west-northwest of Merritt. The beds are contained within a sequence of tuffs, argillites, greywackes and felsic to andesitic flows of the central belt. The limestones generally strike northeast and dip moderately to steeply northwest to southeast. Thicknesses vary up to 30 metres.

The beds are composed of white to black, commonly grey, massive to foliated, fine to coarse-grained, variably siliceous limestone that occasionally contains rounded to angular clasts of volcanic rocks. Thin sections reveal a few grains of quartz and feldspar. An analysis reported by McCammon (1958b) is given in Table 22.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Carr, J.M. (1960): Geology of the Promontory Hills; Minister of Mines Report, pages 26-30.

McCammon, J.W. (1958b): Limestone in the Merritt Area; Minister of Mines Report, pages 94-96.

Harmon Lake NTS: 92H/15E
MINFILE No.: 92HNE182 Latitude: 49°59'18"
Map No.: L140 Longitude: 120°41'21"

Three lenses of limestone enclosed in volcanics of the central belt outcrop in the vicinity of Harmon Lake, northwest of the road that passes west of the lake. A lens of light creamy grey limestone 150 metres long and 60 metres thick forms a prominent bluff, 600 metres north of the road. A second lens of light creamy grey limestone, located 60 metres northwest of the first lens, extends northeastward for 400 metres, with thicknesses of up to 120 metres. Protruding lumps and grains of dolomite and silica give the rock a rough weathered surface. An analysis reported by McCammon (1958b) is given in Table 22.

A third lens of dark grey limestone in tuff and sandstone outcrops over a length of 90 metres and a width of 40 metres 800 metres northwest of the second lens. It is cut by calcite stringers and accompanied by some dolomite and silica.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1958b): Limestone in the Merritt Area; Minister of Mines Report, pages 94-96.

Law's Camp (Tulameen) NTS: 92H/10W
MINFILE No.: 92HNE066 Latitude: 49°33'54"
Map No.: L141 Longitude: 120°54'10"

Two parallel northwest-trending, limestone bands that may represent a single folded bed outcrop on a ridge between Skwum and Britton Creeks, 10.5 kilometres west-northwest of Tulameen. The limestone is enclosed in schist of the western belt and dips 40° to 45° southwest.

Most of the deposit consists of coarse-grained, white limestone containing relatively abundant veins and pods of quartz. Southern exposures are bluish grey and white-banded, coarse-grained limestone with a few inclusions of schist. An analysis reported by McCammon (1963) is given in Table 22.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Eastwood, G.E.P. (1960): Tulameen, Lawless Creek Area; Minister of Mines Report, pages 53-55.

McCammon, J.W. (1963): Limestone near Tulameen; Minister of Mines Report, pages 144-145.

Swakum Mountain NTS: 92I/07E
MINFILE No.: 92ISE098 Latitude: 50°17'19"
Map No.: L142 Longitude: 120°41'19"

Two elongate limestone masses outcrop in volcanics of the central belt on Swakum Mountain, 21 kilometres north-northeast of Merritt.

The first one is a band 30 metres wide trending north for 110 metres in the vicinity of the abandoned workings of the Thelma claim group. It is comprised of dark grey limestone with some calcite stringers and chert nodules.

A second lens, striking 020°, outcrops over a length of 400 metres with an average width of 45 metres, about 1600 metres north of the first band of limestone. It is made up of buff to grey limestone containing brown dolomite grains, calcite stringers and some thin, shaly interbeds. Sulphides are exposed in a shallow pit near the centre of the lens. An analysis reported by McCammon (1958b) is given in Table 22.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1958b): Limestone in the Merritt Area; Minister of Mines Report, pages 94-96.

Nicola Lake NTS: 92I/02E
MINFILE No.: 92ISE145 Latitude: 50°07'35"
Map No.: L143 Longitude: 120°34'29"

A lens of dark grey, siliceous limestone outcrops over a length of 150 metres and a width of 60 metres, 2.5 kilometres south of Nicola Lake, 16 kilometres east of Merritt. The limestone lies within volcanics of the central belt. An analysis reported by McCammon (1958b) is given in Table 22.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1958b): Limestone in the Merritt Area; Minister of Mines Report, pages 94-96.

Walhachin NTS: 92I/14E, 11E
MINFILE No.: 92INW078 Latitude: 50°45'30"
Map No.: L144 Longitude: 121°01'55"

Five lenses of limestone outcrop in the sides of a valley southwest of Walhachin, 17.6 kilometres east-northeast of Ashcroft in the western belt. One lens 15 to 23 metres thick outcrops for 60 metres along the west side of the valley, 750 metres due south of the Walhachin Road bridge. It is composed of extensively fractured, dark grey limestone with inclusions of chert and dolomite. An analysis reported by McCammon (1958a) is given in Table 22.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1958a): Limestone Deposits of the Ashcroft-Clinton Area; Minister of Mines Report, pages 92-93.

Rattlesnake Hill NTS: 92I/14E
MINFILE No.: 92INW082 Latitude: 50°45'49"
Map No.: L145 Longitude: 121°12'00"

Several masses of limestone outcrop on the east side of and near the top of Rattlesnake Hill on the north bank of the Thompson River, 5.3 kilometres northeast of Ashcroft. The limestone is contained within a sequence of argillites and quartzites of the western belt.

The deposits are comprised of sugary textured, light grey to white limestone with small masses and grains of white quartz and blue chert. Several dikes intrude the limestone. An analysis reported by Goudge (1944) is given in Table 22.

Selected Bibliography

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 183-184.

SHOEMAKER FORMATION

The Shoemaker Formation consists of silicified volcanics, primarily greenstone, with some tuff and breccia of Upper Triassic age, outcropping mostly west of Keremeos Creek and southwest of the Similkameen River near Keremeos. The only limestone of any significance outcrops on Olalla Creek north of Keremeos.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Meyers, R.H., Taylor, W.A. and Tempelman-Kluit, D. (1989): Lode Gold-Silver Occurrences of the Okanagan Region, Open File 1989-5.

Geological Survey of Canada:

Bostock, H.S. (1940): Hedley Area; Map 538A.

Bostock, H.S. (1941): Olalla; Map 628A.

Little, H.W. (1961): Geology of Kettle River (West Half) Map Sheet; Map 15-1961.

Tempelman-Kluit, D.J. (1989a): Geology of Penticton, British Columbia; Map 1736A.

Tempelman-Kluit, D.J. (1989b): Geological Map with Mineral Occurrences, Fossil Locations, Radiometric Ages and Gravity Field for Penticton Map Area (NTS 82E), Southern British Columbia; Open File 1969.

Olalla Creek NTS: 82E/05W
MINFILE No.: 82ESW085 Latitude: 49°17'23"
Map No.: L146 Longitude: 119°52'51"

A northwest-trending lens of limestone (marble) up to 60 metres wide outcrops for 150 metres along the north side of Olalla Creek, 5.1 kilometres northwest of Olalla. It is comprised of medium to coarse-grained, white to grey crinoidal limestone, with irregular patches of reddish and brown limestone. The rock is brecciated and well fractured. A thin section of the brown crinoidal limestone contained 20 per cent disseminated quartz grains. An analysis reported by McCammon (1968) is in Table 22.

This deposit was assessed by Apex Exploration & Mining Company Ltd. in 1968 as a source of building stone. A total of 666 tonnes of limestone was quarried that year by Ramshead Quarries Ltd.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1968): Olalla Creek Limestone; Minister of Mines Report, pages 322-323.

Mehner, D.T. (1984): Geological and Geochemical Report on the Hex 1-8 Claims; Assessment Report 12918, page 4.

TAKLA GROUP

The Takla Group is comprised dominantly of andesite, basalt, tuff and breccia with minor conglomerate, greywacke, shale and limestone underlying a broad belt extending from the Horsefly Lake area northwestward to north of the Omineca River. The group also occurs farther west in several fault-bounded blocks on Takla Lake and on the west side of Babine Lake. Several limestone deposits of the Takla Group located southwest of Prince George near Beverley and west of Babine Lake are described below.

Selected Bibliography

Geological Survey of Canada:

Richards, T.A. and Tipper, H.W. (1976): Smithers, B.C. (92L); Open File 351.

Stott, D.F. (1936): Houston, Coast District, British Columbia (92L); Map 671A.

Tipper, H.W. (1960): Prince George, British Columbia; Map 49-1960.

Tipper, H.W. Campbell, R.B. and Taylor, G.C. (1979): Parsnip River, British Columbia; Map 1424A.

Calcite Claims (Fulton Lake) NTS: 93L/16E
MINFILE No.: 93L 308 Latitude: 54°49'00"
Map No.: L147 Longitude: 126°17'18"

Limestone outcrops over a 500 by 1000 metre area on the north side of Fulton Lake, 10 kilometres west of Topley Landing on Babine Lake. An analysis reported by Westgarde (1988) is in Table 22. Equity Silver Mines Ltd. sampled the property in 1988 during a search for a local source of limestone for acid neutralization at the company's mine near Houston.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Equity Silver Mines Ltd., (1989): correspondence in Industrial Mineral File.

Westgarde, E. (1988): prospecting report in Industrial Mineral File.

Beverley NTS: 93G/15W
MINFILE No.: 93G 042 Latitude: 53°45'48"
Map No.: L148 Longitude: 122°56'00"

A body of limestone forms a low knoll projecting above the surrounding glacial till near the centre of Lot 1893, 6 kilometres southwest of Beverley. The limestone strikes 075° and dips 55° south over an exposed length of 75 metres with widths of up to 30 metres. The deposit is comprised of thinly bedded, fine-grained, light grey limestone containing lenses and laminae of white chert. An analysis reported by McCammon (1957) is given in Table 22. A few tonnes of limestone were quarried sometime before 1957 and burnt in a lime kiln on site.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1957): Limestone in the Prince George and Dawson Creek Areas; Minister of Mines Report, page 85.

OMINECA BELT

INGENIKA GROUP

The Ingenika Group is comprised of a thick sequence of interbedded phyllite, schist, quartzite and limestone of Precambrian (Hadrynian) age stretching along the west side of the Rocky Mountain Trench from the Manson River northwestward to the Turnagain River. A prominent carbonate unit, the Espee Formation, has been mapped in detail north of the Ingenika River. South of the river, west of Williston Lake, the Ingenika Group contains significant limestone occurrences that are also likely of the Espee Formation.

The Espee Formation is underlain by phyllite and minor thin-bedded limestone of the Tsaydiz Formation and overlain by sandstone , shale and minor limestone of the Stelkuz Formation. North of the Ingenika River the unit is confined to several parallel, northwest- trending bands in the Russel, Espee and Swannell Ranges. Thicknesses in this region (94CNW, 94FW) range from 150 to 400 metres.

The Espee Formation is comprised of massive to thin-bedded, commonly oolitic, white to grey, fine-grained limestone, that is occasionally recrystallized. Outcrops are typically resistant, massive, blue-grey to ivory-weathering limestone interbedded with less frequent, recessive, well-bedded, yellowish to buff-weathering limestone. The limestone becomes increasingly dolomitic in a northeastward direction, toward the Rocky Mountain Trench. Northeast of the Russel Range, adjacent to the trench, the unit is comprised entirely of partly laminated, orange-buff to cream-weathering dolomite.

South of the Ingenika River, significant limestone occurs in northwest-trending bands on the west side of Williston Lake, probably representing the southward continuation of the Espee Formation. This limestone is typically blue-grey to light grey to creamy white, massive to thickly bedded, rarely thin-bedded, recrystallized and commonly oolitic. It frequently contains persistent zones of coarser grained, sugary, ivory-coloured calcite and sericite. In places it is silty, argillaceous or carbonaceous and occasionally interbedded with slate or phyllite; the more massive limestone is sometimes brecciated. In a few instances the limestone has been hydrothermally altered to siderite.

Selected Bibliography

Geological Survey of Canada:

Armstrong, J.E. and Roots, E.F. (1954): Aiken Lake, Cassiar District, British Columbia; Map 1030A.

Gabrielse, H. (1962): Kechika, British Columbia; Map 42-1962.

Gabrielse, H. (1971): Operation Finlay, North-central British Columbia; *in* Report of Activities, Paper 71-1A, pages 23-25.

Gabrielse, H. (1975): Geology of the Fort Grahame East Half Map-area; Paper 75-33, pages 3-4 and accompanying Map 2-1975.

Gabrielse, H. (1977): Geology of Toodogone and Ware Map-areas, British Columbia (94E, FW 1/2); Open File 483.

Mansy, J.L. (1971): Ingenika Group; in Report of Activities, Paper 71-1A, pages 26-28.

Mansy, J.L. (1972): Sratigraphy and Structure of the Ingenika Group in Finlay and Swannell Ranges; *in* Report of Activities, Paper 72-1A, pages 29-32.

Mansy, J.L. (1974): Operation Finlay; in Report of Activities, Paper 74-1A, pages 17-18.

Mansy, J.L. and Gabrielse, H. (1977): Stratigraphy, Terminology and Correlation of Upper Proterozoic Rocks in the Omineca and Cassiar Mountains, North-central British Columbia; Paper 77-19, pages 5-10.

Roots, E.F. (1954): Geology and Mineral Deposits of the Aiken Lake Map-area, British Columbia; Memoir 274, pages 55-63, 67-69.

Butler Range NTS: 94C/11E
MINFILE No.: 94C 089 Latitude: 56°37'16"
Map No.: L149 Longitude: 125°04'45"

A band of limestone outcrops 5 kilometres south of Ingenika Cone on the north end of the Butler Range and continues southeastward for at least 10 kilometres along the east flank of a belt of gneiss, migmatite and amphibolite of the Wolverine Complex. The limestone is light grey, medium grained and well bedded. Streaks of white, slightly coarser grained, thinly bedded carbonate accompany the limestone. An analysis reported by Roots (1954) is given in Table 23.

Selected Bibliography

Geological Survey of Canada:

Roots, E.F. (1954): Geology and Mineral Deposits of the Aiken Lake Map-area, British Columbia; Memoir 274, pages 67-69.

TABLE 23
ANALYSES OF INGENIKA LIMESTONES

Deposit	Map No.	ID	CaO %	MgO %	SiO_2 %	Al_2O_3 %	Insol. %	R_2O_3 %	Fe_2O_3 %	MnO %	P_2O_5 %	S %	CO_2 %	H_2O %
Butler Range	L149	1	54.82	0.21			0.76	0.18					43.14	0.70
Lookout Hill	L150	2	52.24	1.68			2.72	0.80					42.04	0.88
		3	55.30	0.20			0.50	0.60					42.66	0.86
Osilinka River	L151	4	54.32	0.51			2.30	0.77					41.14	1.58
		5	48.86	0.34			8.50	2.44					39.20	0.72
Swannell River	L152	6	49.24	0.36			9.50	1.08					38.78	0.68
		7	38.42	2.60			22.34	3.86					31.64	1.88
Mount Lay	L153	8	50.58	1.68			5.16	0.92					41.06	1.38

Notes

1. Sample taken 4.8 km due south of the summit of Ingenika Cone (Roots, 1954, p. 68, Sample 389R).
2. Sample of fine-grained, thinly bedded grey limestone on the south slope of Lookout Hill near the shore of Delkluzz Lake (Roots, 1954, p. 69, Sample 216C).
3. Sample of white, coarse-grained recrystallized limestone near the summit of Lookout Hill (Roots, 1954, p. 69, Sample 221C).
4. Sample from the middle of the limestone member (Roots, 1954, p. 68, Sample 23R).
5. Sample of ivory-coloured granular limestone with abundant muscovite from the east side of Tenakihi valley just north of the Osilinka River, 120 m stratigraphically above the previous sample (Roots, 1954, p. 68, Sample 33W).
6. Grab sample of limestone (Roots, 1954, p. 68, Sample 181C).
7. Grab sample of poorly bedded to slatey limestone with sericitic and chloritic partings (Roots, 1954, p. 68, Sample 204R).
8. Grab sample of banded sugary textured limestone taken 360 m stratigraphically above the previous sample (Roots, 1954, p. 68, Sample 203R).

Lookout Hill

NTS: 94C/11E
MINFILE No.: 94C 086 Latitude: 56°41′12″
Map No.: L150 Longitude: 125°10′15″

Limestone underlies a 1300 by 760 metre area on Lookout Hill south of the Ingenika River, 20 kilometres southwest of Williston Lake. Analyses reported by Roots (1954) are given in Table 23.

Selected Bibliography

Geological Survey of Canada:

Roots, E.F. (1954): Geology and Mineral Deposits of the Aiken Lake Map-area, British Columbia; Memoir 274, pages 67-69.

Osilinka River (Tenakihi Creek)

NTS: 94C/03E
MINFILE No.: 94C 085 Latitude: 56°9′34″
Map No.: L151 Longitude: 125°05′36″

A thick limestone member outcrops as a band 1000 metres wide extending 3000 metres north-northeast from the Osilinka River. The limestone and enclosing slate and phyllite strike north and dip 30° to 40° west.

The limestone is pale purple and buff-grey, fine grained and poorly bedded on the crest of a ridge north of the Osilinka River, east of Tenakihi Creek. Analyses reported by Roots (1954) are given in Table 23.

Beds of limestone east of Tenakihi Creek have been locally replaced by siderite.

Selected Bibliography

Geological Survey of Canada:

Roots, E.F. (1954): Geology and Mineral Deposits of the Aiken Lake Map-area, British Columbia; Memoir 274, pages 67-69.

Swannell River (Orion Creek)

NTS: 94C/12W
MINFILE No.: 94C 088 Latitude: 56°34′43″
Map No.: L152 Longitude: 125°45′19″

Limestone outcrops along the northeast side of Swannell River for 2500 metres, west of Orion Creek. The strata strike 135° and dip 35° southwest on the southwest limb of a northwest-trending anticline cored by schist, slate and phyllite.

At 1250 metres above the base of the Ingenika Group the limestone is ivory-buff to rose-yellow in colour and poorly bedded to slatey with very thin sericitic and chloritic partings. Three hundred and sixty metres up section the rock is comprised of pale green and silver-buff, banded, sugary-textured micaceous limestone containing numerous sericitic flakes and a few scattered grains of detrital quartz. The matrix consists of sheared, medium-grained recrystallized calcite. Analyses reported by Roots (1954) are in Table 23.

Selected Bibliography

Geological Survey of Canada:

Roots, E.F. (1954): Geology and Mineral Deposits of the Aiken Lake Map-area, British Columbia; Memoir 274, pages 67-69.

Mount Lay
(Swannell River) NTS: 94C/12E, 11W
MINFILE No.: 94C 087 Latitude: 56°34'25"
Map No.: L153 Longitude: 125°30'01"

Limestone is exposed along the crest of a ridge 4.8 kilometres northwest of the summit of Mount Lay, west of the Swannell River. It strikes north and dips 40° west. The deposit is comprised of massive to platy, light pinkish grey, fine-grained limestone displaying round markings 1 to 3 millimetres in diameter that resemble algal structures. In places the limestone has been replaced by buff to reddish brown, generally coarse-grained siderite. An analysis reported by Roots (1954) are in Table 23.

Selected Bibliography

Geological Survey of Canada:

Roots, E.F. (1954): Geology and Mineral Deposits of the Aiken Lake

REEVES LIMESTONE (LAIB FORMATION)

The Reeves Limestone comprises the basal carbonate member of the Laib Formation, a succession of phyllite, schist, quartzite and limestone of Lower Cambrian age. The Reeves member lies at or near the base of the formation in contact with underlying interbedded phyllite, argillite and limestone of the Truman member or with quartzite and phyllite of the Reno Formation. It is overlain by black argillite of the Emerald member.

The Laib Formation is exposed in three belts extending northeastward from the U.S. border, south of the Pend d'Oreille River and east of the Salmo River, for lengths of up to 40 kilometres. The Reeves Limestone outcrops as discontinuous bands within these belts due to extensive folding and faulting. The more significant limestone occurrences are all in the western belt, where the Reeves member initially trends east-northeast along the south side of the Pend d'Oreille River to its confluence with the Salmo River. It continues north-northeast, mostly along the east side of the Salmo River, to a point 6.8 kilometres due east of the town of Salmo. Overall the limestone varies from 20 to 150 metres thick and from 90 to 107 metres thick within the western belt.

The Reeves member is comprised of blue-grey weathering, grey and white banded to black and white banded to a more uniform grey or white, fine to medium-grained limestone with minor quartz and muscovite. In places bedding planes are coated with mica flakes. Tremolite is locally developed in the limestone between the South Salmo River and the head of Aspen Creek. The limestone is locally altered to buff-weathering, black to light grey, faintly banded to massive and fine-grained dolomite. Dolomite masses are frequently associated with sulphide mineralization in the western belt.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Fyles, J.T. and Hewlett, C.G. (1959): Stratigraphy and Structure of the Salmo Lead-zinc Area; Bulletin 41, pages 25-26, 84-87.

Geological Survey of Canada:

Little, H.W. (1957): Nelson (West Half), Kootenay and Similkameen Districts, British Columbia; Map 3-1956.

Little, H.W. (1960): Nelson Map Area, West Half, British Columbia; Memoir 308, pages 30-35 and accompanying Map 1090A.

Little, H.W. (1965): Salmo, British Columbia; Map 1145A.

Little, H.W. (1985): Geological Notes, Nelson West Half Map Area; Open File 1195, pages 6-7.

Walker, J.F. (1934): Salmo Sheet; Map 299A.

Lost Creek NTS: 82F/03E
MINFILE No.: 82FSW307 Latitude: 49°04'54"
Map No.: L154 Longitude: 117°14'27"

Limestone is mined underground on the north side of Lost Creek, 2.85 kilometres northeast of its confluence with the South Salmo River. The mine is developed in a body of limestone striking 060° and dipping 45° southeast.

The deposit consists mostly of massive, sugary textured, fine-grained (1 mm) white limestone mottled in places with a light yellow colour. Zones of light to dark grey banded limestone, occasionally with rusty streaks, occur within the mine. An analysis reported by Hora (1986) is given in Table 24. The ground limestone is reported to have a brightness of 94.85 per cent.

Limestone has been mined here by International Marble & Stone Company since late 1983 after abandoning the quarry on Swift Creek (L155). A total of 26 380 tonnes of limestone was mined between 1984 and 1987. It is trucked to Sirdar where it is crushed and ground to produce a variety of sized products.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

TABLE 24
ANALYSES OF REEVES LIMESTONES

Deposit	Map No.	ID	CaO %	MgO %	SiO_2 %	Al_2O_3 %	Insol. %	R_2O_3 %	Fe_2O_3 %	MnO %	P_2O_5 %	S %	LOI %	H_2O %
								TiO_2*						
Lost Creek	L154	1	52.8	0.82	1.31	1.29		0.02	0.13	0.055			43.25	
Swift Creek	L155	2	50.89	1.7			6.32	0.46	0.46	0.012	0.011	0.014	41.16	nil
S. Salmo River	L156	3	53.9	0.86			2.06							
		4	54.5	0.94			0.96							
Wallack Creek	L157	5	52.4	1.71			3.28							
		6	42.2	5.09			14.3							

Notes

1. Sample of typical fragments from freshly opened face (Hora, 1986, p. 240).
2. Composite of chips taken at 30 cm intervals across 18.9 m of limestone near the top of the quarry (McCammon, 1962, p. 154).
3. Chip sample taken along 122 m of north-trending bluff, north of the South Salmo River (Fyles, 1956, Sample 9266).
4. Chip sample up 36.6 m of a bluff 120 m south of the old highway bridge over the South Salmo River (Fyles, 1956, Sample 9267).
5. Sample across 12 to 15 m of strata along the lowest limestone bluffs 180 to 270 m north of the Salmo Valley logging road (Fyles, 1956, Sample 9228).
6. Sample across 12 to 15 m of strata along the lowest limestone bluffs 180 to 270 m north of the Salmo Valley logging road (Fyles, 1956, Sample 9229).

**Refers only to values immediately following.*

Hora, Z.D. (1986): New Developments in Industrial Minerals; in Geological Fieldwork 1985, Paper 1986-1, page 240.

Swift Creek NTS: 82F/03W
MINFILE No.: 82FSW215 Latitude: 49°04'06"
Map No.: L155 Longitude: 117°16'55"

A band of limestone outcrops on Swift Creek, 500 metres northwest of its confluence with the Salmo River, and continues northeastward for 450 metres. Bedding strikes 049° and dips 40° northwest. The deposit is comprised of beds of blue grey and white medium-grained limestone 2.5 to 5 centimetres thick interlayered with a few zones of coarse-grained, white limestone (marble) 60 to 90 centimetres thick. An analysis reported by McCammon (1962) is in Table 24.

International Marble & Stone Company initially quarried some limestone in 1962, on Lot 1594, 90 metres north of Swift Creek.

Quarrying operations recommenced in 1969 and continued up to 1983, when the company encountered access problems to the site. A total of 70 470 tonnes of limestone was quarried between 1972 and 1983.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1962): International Marble and Stone Company Limited; Minister of Mines Report, page 154.

South Salmo River NTS: 82F/03W
MINFILE No.: 82FSW339 Latitude: 49°04'39"
Map No.: L156 Longitude: 117°15'45"

Limestone outcrops in a series of bluffs on either side of the South Salmo River just east its confluence with the Salmo River. These exposures are at the south end of a band of limestone up to 1 kilometre wide extending northeast for 4.5 kilometres. Bedding generally strikes east to northeast and dips 35° to 55° south.

The bluffs are comprised of fine to medium-grained thin-bedded white and blue limestone with siliceous and dolomitic interbeds. Two analyses reported by Fyles (1956) are in Table 24.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Fyles, J.T. (1956): memorandum, March 28, in Industrial Mineral File.

McCammon, J.W. (1959): Limestone in the West Kootenay Area; Minister of Mines Report, pages 172-173.

Wallack Creek NTS: 82F/03W
MINFILE No.: 82FSW262 Latitude: 49°02'23"
Map No.: L157 Longitude: 117°19'24"

Limestone outcrops 250 to 1200 metres north of the Salmo River, east of Wallack Creek. The unit strikes 050° for 950 metres and dips 45° southeast. Exposed widths vary from 250 to 320 metres. The limestone is fine to medium-grained and uniform grey to thinly banded black and white in colour. Analyses of two samples collected

along the lowest limestone bluffs 180 to 270 metres north of the Salmo Valley logging road are given in Table 24.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Fyles, J.T. (1956): memorandum, March 28, in Industrial Mineral File.

BADSHOT FORMATION

The Badshot Formation is a widespread limestone-dolomite unit of Lower Cambrian age in the southeastern Omineca Belt. It is underlain by interbedded calcareous schist, quartzite and marble of the Lower Cambrian Mohican Formation or by quartzite and schist of the Lower Cambrian Hamill Group and is overlain by schist, gneiss, amphibolite and marble of the Middle Cambrian to Mississippian Lardeau Group.

The Badshot Formation outcrops in a broad arc beginning east of Nelson on the west side of Kootenay Lake, crossing Kootenay Lake east of Proctor to Crawford Bay and continuing northward along the east side of the lake. The formation continues northwestward through Rogers Pass to just east of the Columbia River, north of Revelstoke. It is also exposed north of Kaslo on the west side of the lake. The bed commonly outcrops as a series of parallel bands trending north to northwest due to repetition by complex folding. The formation tends to be thickened in the cores of the folds and thinned along their limbs, making it difficult to estimate its true thickness. North of Crawford Bay the unit varies from 15 to 30 metres in true thickness, but is locally thickened up to several hundred metres along some of the folds. In the Duncan Lake area, north of Kootenay Lake, true thicknesses range from 6 to 100 metres.

The unit is commonly comprised of massive to banded, dark grey to white, fine to medium-grained recrystallized limestone with some tremolite, phlogopite, graphite and wollastonite. In a few instances, such as north of Crawford Bay, in the Duncan Lake area and north of Revelstoke, the entire formation is locally comprised of black to grey to white, fine to medium-grained dolomite, usually with some siliceous impurities.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Fyles, J.T. (1964): Geology of the Duncan Lake Area, Lardeau District, British Columbia; Bulletin 49, pages 24-25, 67-69.

Fyles, J.T. and Eastwood, G.E.P. (1962): Geology of the Ferguson Lake Area, Lardeau District, British Columbia; Bulletin 45, pages 17-18.

Höy, T. (1980): Geology of the Riondel Area, Central Kootenay Arc, Southeastern, British Columbia; Bulletin 73, page 26.

Geological Survey of Canada:

Bancroft, M.F. (1929): Lardeau Area; Map 235A.

Cairnes, C.E. (1934): Slocan Mining Camp, British Columbia; Memoir 173, page 34.

Reesor, J.E. (1957): Lardeau (East Half), Kootenay District, British Columbia; Map 12-1957.

Reesor, J.E. (1972): Geology of the Lardeau Map-area, East Half, British Columbia; Memoir 369, pages 58-59 and accompanying Map 1326A.

Reesor, J.E. (1982): Kaslo; Open File 929.

Rice, H.M.A. (1941): Nelson Map Area, East Half; Memoir 228, pages 20-21 and accompanying Map 603A.

Walker, J.F. (1930): Lardeau Map-area, British Columbia, General Geology; Memoir 161, pages 10-11, 114.

Wheeler, J.O. (1962): Rogers Pass Map Area, British Columbia; Paper 62-32, pages 6-7 and accompanying Map 43-1962.

Wheeler, J.O. (1965): Big Bend Map Area, British Columbia; Paper 64-32, pages 11-12 and accompanying Map 12-1964.

Crawford Creek NTS: 82F/10W
MINFILE No.: 82FNE113 Latitude: 49°41'33"
Map No.: D006 Longitude: 116°48'06"

Dolomite is mined underground by International Marble & Stone Company, 600 metres south of Crawford Creek, 2.4 kilometres northeast of the Crawford Bay Post Office.

The mine is situated in a band of limestone and dolomite extending north-northeast of the head of Crawford Bay for at least 12 kilometres. The bed outcrops along the east flank of the Preacher Creek antiform, a tight, overturned, eastward-closing fold cored by gneiss, schist and amphibolite of the Middle Cambrian to Mississippian Lardeau Group. At the mine site a foliation that possibly represents bedding strikes 010° and dips 26° west. Elsewhere the dip is much steeper.

The deposit is comprised of white, medium-grained dolomite containing scattered crystals of various metamorphic minerals, especially quartz and tremolite. The dolomite develops a brown staining on weathered surfaces. The stone exhibits a brightness of 93.05 per cent (green filter) when ground to -200 mesh (J. Halliday,

TABLE 25
ANALYSES OF BADSHOT LIMESTONES

Deposit	Map No.	ID	CaO %	MgO %	SiO_2 %	Al_2O_3 %	Insol. %	R_2O_3 %	Fe_2O_3 %	MnO %	P_2O_5 %	S %	LOI %	H_2O %
Crawford Creek	D006	1	30.26	20.17			2.14	0.77 TiO_2*	0.92	0.021	0.012 Na_2O*	0.01 K_2O*	46.37	0.04
Oro Viejo Claims	D007	2	33.98	18.15	0.41	0.15		0.023	0.21	0.024	0.013	0.018	46.21	
Marble Head	L158	3	50.8	4.01	0.36	0.01			0.45			0.01		
		4	55.5	0.34	0.24	trace			0.16			0.02		
Lardeau	L159	5	51.11	3.21	1.96	0.27			0.21			0.01		
Pilot Point	D008	6	30.32	20.18	3.94	0.71			0.49			0.02		
		7	27.70	16.80	14.12	trace				0.52				39.94
Schroeder Creek	L160	8	50.02ϕ	3.26ϕ			2.91	0.48						
		9	53.83ϕ	1.20ϕ			0.52	0.56						
Riondel	L161	10	48.71	3.93	4.96	0.22			0.16			0.02		
Albert Canyon	L162	11	46.48	6.74	2.44	0.61			0.44			0.01		

Notes

1. *Composite of random chips from quarry (McCammon, 1964, p. 184).*
2. *Average of 27 grab samples taken over 7.3 km strike length (Komarachka, 1987, p. 10a).*
3. *Sample across 8.5 m of bluish grey and white limestone 0.4 km north of Marble Head (Goudge, 1944, p. 212, Sample 81).*
4. *Sample across 1.8 m of bluish white, medium-grained limestone in underground working 1.1 km north of Marble Head (Goudge, 1944, p. 212, Sample 81B).*
5. *Composite of chips taken at 60 cm inservals across 15 m of light and dark bluish grey limestone south of the quarry (Goudge, 1944, p. 212, Sample 82A).*
6. *Sample from northern edge of dolomite band (Goudge, 1944, p. 212, Sample 85A).*
7. *Drill-core sample (Rookes, 1973).*
8. *Dark grey limestone (Cairnes, 1934, p. 34).*
9. *Light grey limestone (Cairnes, 1934, p. 34).*
10. *Sample across 15 m limestone section south of Bluebell minesite (Goudge, 1944, p. 212, Sample 84).*
11. *Sample across the carbonate bed (Goudge, 1944, p. 191, Sample 52).*

*Refers only to values immediately following.
ϕ Values converted from $CaCO_3$ and $MgCO_3$.*

1991, personal communication). Numerous randomly orientated fractures occur with spacings of 10 to 15 centimetres. An analysis reported by McCammon (1964) is in Table 25.

International Marble and Stone Company initially quarried dolomite on the south side of Crawford Creek, 600 metres north of the current mine site, during 1962 and 1963. In 1964 quarrying began at the current site. Underground mining began in 1969 in order to produce a cleaner product. Between 1962 and 1987 some 689 000 tonnes of dolomite were mined. The dolomite is trucked to the company's plant in Sirdar where it is crushed, ground and screened to produce a variety of sized products.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1964): International Marble and Stone Company Limited; Minister of Mines Report, page 184.

Olson, P.E. (1974): Crawford Creek Dolomite Quarry; in Geology, Exploration and Mining in British Columbia 1973, page 541.

Oro Viejo Claims

NTS: 82M/10E
MINFILE No.: 82M 254 Latitude: 51°39′27″
Map No.: D007 Longitude: 118°35′53″

A body of dolomite comprising the Badshot Formation trends north-northwest for 7 kilometres, crossing the Goldstream River a kilometre east of its confluence with the Columbia River, approximately 78 kilometres north-northwest of Revelstoke. The unit dips gently to the west. An average foliation strikes 090° and dips 36° north. A decollement may have caused local thickening of the formation.

The deposit consists of snow-white, microcrystalline, earthy to chalky massive dolomite, displaying zones of tectonic brecciation along the strike of the formation. A zone of high-purity dolomite (95-99 per cent dolomite) occurs over a strike length of 4 kilometres with a width of 500 metres in the north and over 1500 metres in the south. Outcrops at various elevations suggest that the high-purity zone extends down dip for a vertical depth of at least 550 metres. This zone is estimated to contain a significant tonnage of high- purity dolomite. The average analysis of 27 grab samples collected over a 7.3 kilometre strike length is given in Table 25. The range of compositions (in per cent) is as follows (Komarechka, 1987, p. 10a): CaO, 29.94 to 49.66; MgO, 4.59 to 21.72; SiO_2, 0.04 to 4.06; Al_2O_3, 0.02 to 1.28; Fe_2O_3, 0.09 to 0.60; MnO, 0.006 to 0.090; TiO_2, 0.02 to 0.07; Na_2O, 0.003 to 0.100; K_2O, 0.001 to 0.308; L.O.I., 42.25 to 47.15. Nineteen of the

samples contained greater than 21 per cent MgO and seventeen less than 0.10 per cent SiO_2.

This property was mapped and sampled by R.G. Komarechka in 1987.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Komarechka, R. (1987): Geological Report on the Oro Viejo Claims; Assessment Report 16604.

Marble Head NTS: 82K/07W
MINFILE No.: 82KSE076 Latitude: 50°15'38"
Map No.: L158 Longitude: 116°58'20"

A band of limestone outcrops between 0.4 and 1.6 kilometres north of Marble Head just north of Kootenay Lake. Bedding strikes 120° to 125° and dips 40° northeast. The unit is estimated to be 150 metres thick at this locality.

The band is comprised of fine to medium-grained, uniform white to banded bluish grey and white limestone containing a few siliceous streaks, a few flakes of golden mica and some graphite. In one instance a few veins of white quartz cut the limestone. Analyses reported by Goudge (1944) are in Table 25.

Blocks of marble were produced for structural applications from a quarry 0.45 kilometre north of Marble Head and from an underground chamber 0.65 kilometre farther north, by the Canadian Granite and Marble Company Ltd. between 1909 and 1936.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1959): Limestone in the West Kootenay Area; Minister of Mines Report, pages 170-171.

White, G.V. (1987): Dimension Stone Quarries in British Columbia; *in* Geological Fieldwork 1986, Paper 1987-1, pages 311-317.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 207-210.

Parks, W.A. (1917): Report on the Building and Ornamental Stones of Canada; Report 452, Volume 5, pages 128-134.

Lardeau NTS: 82K/02W
MINFILE No.: 82KSE077 Latitude: 50°09'40"
Map No.: L159 Longitude: 116°57'32"

Limestone outcrops along a cliff on the west side of Kootenay Lake, north of Lardeau. The outcrop is part of a narrow band of limestone trending northward for 4.4 kilometres. The limestone dips gently westward on the east limb of a tight overturned antiform cored by schist of the overlying Lardeau Group.

A quarry on the north end of the band exposes medium-grained, dark bluish grey to banded bluish grey and white limestone, containing some interbeds of highly siliceous limestone 5 centimetres to at least 60 centimetres thick. Quartz stringers and thin streaks of brown-weathering slate are also evident. An analysis reported by Goudge (1944) is in Table 25.

The limestone was quarried for flux for the smelter at Nelson between 1896 and 1907. The quarry is developed at the foot of the limestone cliff, 1.6 kilometres north of Lardeau.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1959): Limestone in the West Kootenay Area; Minister of Mines Report, page 172.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 210, 212.

Pilot Point (Crawford Peninsula) NTS: 82F/10W
MINFILE No.: 82FNE075 Latitude: 49°38'00"
Map No.: D008 Longitude: 116°49'47"

A band of dolomite outcrops on the east shore of Kootenay Lake, 3 kilometres northwest of Cape Horn (Pilot Point), and continues northeastward for 3.5 kilometres across Crawford Peninsula to Crawford Bay. The band, which strikes 040° and dips 70° northwest on Kootenay Lake, is 150 metres thick at this location.

The exposures on Kootenay Lake are white to yellowish white, medium-grained dolomite with quartz veins, golden mica grains and patches of various silicates. The dolomite becomes interbedded with schistose rocks near the northern edge of the band. Numerous dikes intrude the dolomite. An analysis reported by Goudge (1944) and a second on diamond-drill core are in Table 25. Diamond drilling by International Marble and Stone Company in 1973 and 1976 on the northeast end of the

band at Crawford Bay encountered mostly white to bluish grey dolomite with some pink and rusty zones.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Lysohirka, T. (1976): Diamond Drilling Report on the Cottage Claims; Assessment Report 6249.

Rookes, W. (1973): Diamond Drilling Report on the Cottage Claims; Assessment Report 4923.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, page 212.

Schroeder Creek NTS: 82K/02W
MINFILE No.: 82KSE082 Latitude: 50°02'05"
Map No.: L160 Longitude: 116°54'34"

Limestone was quarried earlier this century near the mouth of Schroeder Creek on the west side of Kootenay Lake for flux for the smelter at Nelson. The quarry lies in a band of light grey to dark grey, massive, coarse-grained limestone that trends north-northwest for 2.0 kilometres, crossing the creek 0.4 kilometre above its mouth. The bed dips steeply to the east. Analyses reported by Cairnes (1934) are in Table 25.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1959): Limestone in the West Kootenay Area; Minister of Mines Report, page 172.

Geological Survey of Canada:

Cairnes, C.E. (1934): Slocan Mining Camp, British Columbia; Memoir 173, page 34.

Riondel NTS: 82F/15W
MINFILE No.: 82FNE157 Latitude: 49°45'40"
Map No.: L161 Longitude: 116°51'30"

Limestone outcrops along the west shore of Galena Bay on the east side of Kootenay Lake and continues northward across a small promontory jutting out into the lake for 1600 metres. The bed strikes north and dips 35° west. Thicknesses vary up to 60 metres.

The bed is comprised predominantly of calcium limestone interbedded with dolomite. Near the Bluebell mine the limestone contains galena and pyrite with silicates and graphite. Tremolite and quartz become abundant near the top and bottom of the bed. An analysis reported by Goudge (1944) is in Table 25. A small amount of limestone was quarried from this location to produce lime, sometime before 1944.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1959): Limestone in the West Kootenay Area; Minister of Mines Report, page 172.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 211-212.

Albert Canyon NTS: 82N/04W
MINFILE No.: 82N 072 Latitude: 51°09'05"
Map No.: L162 Longitude: 117°49'42"

A bed of limestone 15 metres thick, correlated to the Lower Cambrian Badshot Formation, outcrops on either side of the Illecillewaet River in Albert Canyon, 10 kilometres southwest of Glacier National Park. The bed strikes northwest for 1500 metres and dips 40° northeast. It generally consists of fine to medium-grained, bluish grey limestone interbedded with some light grey limestone. In places it is comprised almost entirely of dolomite. The deposit is cut by thin, white calcite veinlets. Occasional crystals of sphalerite are also present. An analysis reported by Goudge (1944) is in Table 25.

The limestone was used to produce lime in a pot kiln on the south side of the Canadian Pacific Railway track, sometime previous to 1940. In the early 1940s the deposit was investigated as a potential source of marble.

Selected Bibliography

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 187-188, 191.

TSHINAKIN LIMESTONE (EAGLE BAY ASSEMBLAGE)

The Eagle Bay assemblage contains a prominent unit of Lower Cambrian limestone outcropping in the Adams Lake region, referred to as the Tshinakin limestone mem-

TABLE 26
ANALYSES OF TSHINAKIN AND MURAL LIMESTONES

Deposit	Map No.	ID	CaO %	MgO %	SiO_2 %	Al_2O_3 %	Insol. %	R_2O_3 %	Fe_2O_3 %	MnO %	P_2O_5 %	S %	LOI %	H_2O %
Vavenby	L163	1	54.95	0.30	0.68	0.18						0.01		
Ptarmigan Creek	L165	2	54.58	0.87	0.20	0.02			0.07			trace		
		3	42.67	11.35	0.32	0.11			0.38			trace		
Bowron River	L166	4	46.8	7.6	0.34	0.08	Cr_2O_3*	TiO_2*	0.11		K_2O*	Na_2O*	46.60	
		5	53.9	0.8	2.16	0.10	0.01	0.01	0.07	0.01	0.07	0.01		
Hansard	L167	6	55.10	0.42			1.04	0.26	0.10	0.01	0.01	0.02	43.38	0.08
Highway 16	L168	7	53.01	0.84			1.78	0.70	0.53	trace	0.03	0.13	42.74	0.06

Notes

1. Representative sample of limestone from quarry (Goudge, 1944, p. 217, Sample 95).
2. Sample across bed of high-calcium limestone (Goudge, 1944, p. 221, Sample 98).
3. Sample of brown magnesian limestone (Goudge, 1944, p. 221, Sample 98A).
4. Sample from stockpile of crushed limestone (Horu, 1986, p. 240).
5. Average of 12 grab samples of limestone talus (Suess, 1987).
6. Chip sample across 60 m of limestone 1.76 km northwest of the railway crossing (McCammon, 1957, p. 84).
7. Composite of chips taken at 30 cm intervals across 6 m of limestone (McCammon, 1978, p. 396).

**Refers only to values immediately following.*

ber. It lies enclosed in chloritic schists and greenstones derived from mafic volcanics and volcaniclastics.

The Tshinakin member is well exposed in a belt extending northwestward from Pisima Mountain on Adams Plateau across Adams Lake for 22 kilometres to just south of South Barriere Lake, where it terminates abruptly. It is inferred that this termination marks an original interruption in the carbonate bank or reef complex as the units above and below continue to the northwest. The unit also occurs in several irregular bands that extend eastward from Scotch Creek to Seymour Arm on the north side of Shuswap Lake. To the northwest, near the southern margin of the Baldy batholith, the Tshinakin limestone is exposed on the east side of the North Barriere River, 6 kilometres north of its confluence with the Barriere River. It reappears on the north side of the Baldy batholith, outcropping just north and south of Vavenby on either side of the North Thompson River. The unit locally approaches 1000 metres in thickness.

The Tshinakin Limestone is comprised predominantly of light grey to white, massive, fine-grained limestone that is sometimes interbedded with quartzite and phyllite. The unit is dolomitic in a few instances.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Preto, V.A. (1979): Barriere Lakes - Adams Plateau Area (82L/13E; 82M/4,5W; 92P/1E,8E); *in* Geological Fieldwork 1978, Paper 1979-1, page 34.

Preto, V.A., McLaren, G.P. and Schiarizza, P. (1980): Barriere Lakes - Adams Plateau Area (82L/13E; 82M/4, 5W; 92P/1E, 8E); *in* Geological Fieldwork 1979, Paper 1980-1, page 33.

Schiarizza, P. (1983): Geology of the Barriere River - Clearwater Area; Preliminary Map 53.

Schiarizza, P. (1986a): Geology of the Eagle Bay Formation between Raft and Baldy Batholiths (82M/5 ,11, 12); *in* Geological Fieldwork 1985, Paper 1986-1, pages 90-92.

Schiarizza, P. (1986b): Geology of the Vavenby Area (82M/5,11,12); Open File 1986-5.

Schiarizza, P. and Preto, V.A. (1984): Geology of the Adams Plateau - Clearwater Area; Preliminary Map 56.

Schiarizza, P. and Preto, V.A. (1984): Geology of the Adams Plateau - Clearwater - Vavenby Area; Paper 1987-2, pages 18-20.

Geological Survey of Canada:

Campbell, R.B. (1963): Adams Lake Map-area, British Columbia; Map 48-1963.

Okulitch, A.V. and Campbell, R.B. (1979): Lithology, Stratigraphy, Structure and Mineral Occurrences of the Thompson-Shuswap-Okanagan Area, British Columbia; Open File 637.

Vavenby NTS: 82M/12E
MINFILE No.: 82M 182 Latitude: 51°35'40"
Map No.: L163 Longitude: 119°44'40"

This deposit is situated 1 to 5 kilometres northwest of Vavenby on the north side of the North Thompson River. Limestone was quarried here up to 1933. A band of limestone extends northwest of Vavenby for 4

kilometres, forming a small steep-sided mountain known locally as "Lime Bluff". The limestone is locally up to several hundred metres thick and continues southeastward, crossing the North Thompson River.

The deposit is comprised mostly of sugary textured, pale blue to nearly white, massive, high-calcium limestone that tends to break into small angular fragments. The easternmost knob of the mountain exposes pale blue, brown-weathering dolomite with irregular masses and veins of quartz. An analysis reported by Goudge (1944) is in Table 26. A small quarry and lime kiln were operated by W. Elliot during the early 1930s.

Selected Bibliography

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 216-217.

Onyx Creek (Marje Claims) NTS: 82M/03W
MINFILE No.: 82M 183 Latitude: 51°02'19"
Map No.: L164 Longitude: 119°17'07"

This occurrence is located on the southwest flank of Crowfoot Mountain, 16 kilometres north of Maona Bay on Shuswap Lake. Two limestone horizons of the Tshinakin member outcrop in the headwaters of Onyx (Manson) Creek, east of Scotch Creek. They are separated by 140 metres of interbedded phyllite and quartzite. The entire sequence is intruded by a few lamprophyric to dioritic dikes and sills. The beds generally strike 090° and dip 45° north.

The upper unit is comprised of approximately 45 metres of white to greyish white, white-weathering, medium-grained (1-2 mm) recrystallized, dolomitic limestone that is cut by a network of opaque white quartz veins near contacts with the enclosing hostrocks. Some patches and seams of buff-coloured argillaceous and siliceous rock occur within the limestone. Minor graphite is also present. Near the base of the unit the limestone is intruded by some porphyritic lamprophyre dikes at least 1.5 metres wide. The limestone horizon outcrops over a 300 by 90 metre area.

The lower unit 18 metres thick, contains fine-grained, white-weathering limestone with some pyrite. Magnesium and silica contents vary up section and along strike.

The deposit was staked by Omar Paquette in 1973. Development work is limited to some trenching and diamond drilling.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

White, G. (1974): Preliminary Report - Marje Claims 1 to 4; unpublished report in Property File.

MURAL FORMATION

The Mural Formation is a Lower Cambrian unit comprised of two carbonate members separated by a shale member exposed west of the Rocky Mountain Trench. The unit generally outcrops in northwest-trending bands of varying length projecting above Pleistocene to recent glacial sediments east and southeast of Purden Lake to Bowron Lake Provincial Park, between the Fraser and Bowron Rivers. The formation varies in thickness from 150 metres near the Rocky Mountain Trench to 730 metres farther west.

The limestone is typically medium to light grey, massive, fine-grained and variably dolomitic and oolitic.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Lay, D. (1941): Fraser River Tertiary Drainage History in Relation to Placer Gold Deposits; Bulletin 11, pages 31-32.

Geological Survey of Canada:

Campbell, R.B., Mountjoy, E.W. and Young, F.G. (1973): Geology of the McBride Map-area, British Columbia; Paper 72-35, pages 51-54 and accompanying Map 1356A.

Taylor, G.C. and Stott, D.F. (1979): Monkman Pass Map-area, British Columbia (93I); Open File 630.

Ptarmigan Creek (Urling) NTS: 93H/10W
MINFILE No.: 93H 017 Latitude: 53°40'46"
Map No.: L165 Longitude: 120°54'30"

A band of limestone outcrops on Ptarmigan Creek and continues southeastward along the west side of the Fraser River for 5 kilometres. The band varies up to 800 metres in width. Bedding strikes 120° to 150° and dips 25° to 40° southwest.

The band is composed mostly of pale blue to grey, high-calcium limestone, with some pink and light brown streaks, patches and lenses of magnesian limestone developed along vertical to steeply dipping fracture zones. The limestone in these fracture zones contains disseminated dolomite and minor quartz and muscovite of hydrothermal origin. Several such zones have been exposed in a quarry face. Analyses reported by Goudge (1944) are in Table 26.

A quarry has been developed on the east side of Ptarmigan Creek, at the north end of a northwest-trending ridge, 2.5 kilometres due west of Urling. It was initially

operated by the Canadian National Railway as early as the 1940s to supply limestone for railroad ballast. Between 1967 and 1984 the quarry was operated by Quesnel Readi-Mix Cement Co. Ltd. A total of 3.35 million tonnes of limestone has been produced of which 514 000 tonnes were supplied to pulp mills and 2 837 000 tonnes were used for riprap and railroad ballast.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1973): Ptarmigan Creek Quarry; in Geology, Exploration and Mining in British Columbia 1972, pages 601-602.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 220-221.

Bowron River NTS: 92H/12E
MINFILE No.: 93H 073 Latitude: 53°42'40"
Map No.: L166 Longitude: 121°41'38"

Limestone of the Mural Formation (?) outcrops over a 750 by 1000 metre area on the steep west side of a small conical mountain, 4.5 kilometres east of the Bowron River, 23.8 kilometres south-southeast of the junction of Highway 16 and the Bowron River logging road.

The deposit is comprised of medium to coarse-grained (3-5 mm), white to grey to black limestone. The white to light grey rock occurs higher up the mountainside while the dark grey to black variety crops out near the base of the mountain. Analyses reported by Hora (1986) and Suess (1987) are in Table 26.

Western Lime & Marble Inc. developed a small quarry in the face of a cliff in 1983. Some limestone intended for the agricultural markets in Alberta was crushed on site. The high cost of transporting the product to Alberta led to the closure of the operation.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Hora, Z.D. (1984): Industrial Minerals and Structural Materials; in Geological Fieldwork 1983, Paper 1984-1, pages 215, 216.

Hora, Z.D. (1986): New Developments in Industrial Minerals; in Geological Fieldwork 1985, Paper 1986-1, page 240.

Suess, M. (1987): Prince George Calcareous Deposits; unpublished report in Industrial Mineral File.

Hansard NTS: 93I/04W
MINFILE No.: 93I 006 Latitude: 54°05'45"
Map No.: L167 Longitude: 121°53'21"

A body of limestone forms a ridge extending northwest along the south side of the old Highway 16, between 1.6 and 4 kilometres northwest of the railway crossing at Hansard.

The deposit consists of massive, fine to medium-grained, light grey to black, intensely fractured limestone. It is intruded by a few dikes and cut by numerous white calcite veinlets. An analysis reported by McCammon (1957) is in Table 26.

Two small quarries opened up on the deposit produced limestone for road building material sometime between 1957 and 1965.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1957): Limestone in the Prince George and Dawson Creek Areas; Minister of Mines Report, pages 84-85.

McCammon, J.W. (1965): Hansard; Minister of Mines Report, page 266.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 220-221.

Highway 16 NTS: 93H/13E
MINFILE No.: 93H 020 Latitude: 53°53'47"
Map No.: L168 Longitude: 121°41'38"

Black, well-bedded limestone of uniform appearance is exposed in a road-cut 400 metres long along Highway 16, 72 kilometres east of Prince George. The beds, which strike 110° and dip 25° north, vary from a few centimetres to a few metres thick. An analysis reported by McCammon (1970) is in Table 26.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1970): Limestone - Highway 16; *in* Geology, Exploration and Mining in British Columbia 1969, page 396.

LOWER CAMBRIAN LIMESTONE - MCLEOD LAKE-CROOKED RIVER AREA

A Lower Cambrian sequence of dolomite and limestone with interbedded sandstone, quartzite, shale and siltstone outcrops in a series of parallel bands extending southeastward from McLeod and Williston lakes, between the Parsnip and Crooked rivers. It is underlain by slates and greywackes of the Misinchinka Group and overlain by shales, slates, siltstones and thin-bedded limestones of the Kechika Group.

Selected Bibliography

Geological Survey of Canada:

Armstrong, J.E., Tipper, H.W., Hoadly. J.W. and Muller, J.E. (1962): McLeod Lake, British Columbia; Map 2-1962.

Armstrong, J.E., Tipper, H.W., Hoadly. J.W. and Muller, J.E. (1969): McLeod Lake, British Columbia; Map 1204A.

Tacheeda Lakes NTS: 93J/10E
MINFILE No.: 93J 019 Latitude: 54°43'00"
Map No.: L169 Longitude: 122°31'44"

The Tacheeda Lakes prospect lies within a band of Lower Cambrian carbonates that trends northwest for 41 kilometres and varies up to 5 kilometres in width.

Limestone is exposed in an old quarry adjacent to the B.C. Railway, just northeast of the isthmus separating the Tacheeda Lakes. Smaller exposures occur in a road-cut 130 metres northwest of the quarry. The limestone is estimated to be at or near surface in an area 80 to 100 metres wide extending for 280 metres northwest of the quarry. Indistinct bedding at the quarry strikes 110° and dips 50° south, while in a road-cut to the northwest it strikes 155° and dips 45° east.

The limestone is dark grey to black and very fine-grained. The rock is cut by veins of creamy white calcite up to 0.5 metre wide.

Nine chip samples taken perpendicular to strike over widths of 5 metres averaged 52.7 per cent CaO (94.1 per cent $CaCO_3$) (Klein, 1983, p. 6). The calcite veins were excluded from sampling because of their erratic nature. Probable (indicated) and possible (inferred) reserves are each estimated at 750 000 tonnes for a total of 1.5 million tonnes (Klein, 1983, p. 7).

B.C. Railway Co. initially quarried some of the limestone for railroad ballast. Diamond Limestone Ltd. proposed developing the deposit to supply agricultural limestone to Alberta. Some mapping and sampling was conducted by the company in 1983.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Klein, G. (1983): Geological Report on the Proposed Tacheeda Lakes Limestone Quarry; unpublished report in Industrial Mineral File.

NELWAY FORMATION

The Nelway Formation consists of a Middle Cambrian carbonate sequence correlated with the Metaline limestone of Washington State, just across the border. The unit is underlain by quartzite and phyllite of the Lower Cambrian Laib Formation and overlain by argillite of the Ordovician Active Formation.

The Nelway Formation is confined to two irregular belts extending northeast from the U.S. border to the South Salmo River on either side of the Sheep Creek anticline. The western belt stretches from Nelway and the Pend d'Oreille River at the 49th Parallel to just east of Rosebud Lake, a length of 9 kilometres. The eastern belt extends northeastward from the border for 6.3 kilometres to Ripple Creek, crossing the South Salmo River. The formation is estimated to be 1370 to 1520 metres thick.

The unit is comprised of three members, a lower limestone, a middle dolomite and a an upper limestone. The limestone members are locally dolomitized, sometimes making it difficult to separate these two members from the middle dolomite.

The lower member is comprised of 150 to 240 metres of dark blue to grey to white, fine-grained limestone and argillaceous limestone that is interbedded with calcareous phyllite near its base.

The middle member consists either of massive light to dark grey or banded light grey and black, fine-grained dolomite that is siliceous in many places. In the eastern belt, on either side of the South Salmo River, rounded chert nodules locally form more than half of the rock. This member together with the upper member ranges in thickness from 1200 to 1370 metres.

The upper member is exposed at only a few locations north of the border. The limestone is thinly banded black and white on the east side of Russian Creek between the Pend d'Oreille River and the border. Numerous chert nodules are present near its base.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Fyles, J.T. and Hewlett, C.G. (1959): Stratigraphy and Structure of the Salmo Lead-zinc Area; Bulletin 41, pages 28-30.

Geological Survey of Canada:

Little, H.W. (1957): Nelson (West Half), Kootenay and Similkameen Districts, British Columbia; Map 3-1956.

Little, H.W. (1960): Nelson Map Area, West Half, British Columbia; Memoir 308, pages 35-39 and accompanying Map 1090A.

Little, H.W. (1965): Salmo, British Columbia; Map 1145A.

Little, H.W. (1985): Geological Notes, Nelson West Half Map Area; Open File 1195, pages 7-8.

Purex Lime (Nelway) NTS: 82F/03W
MINFILE No.: 82FSW253 Latitude: 49°00'56"
Map No.: L170 Longitude: 117°17'22"

Limestone forms a hill 140 metres high on the north end of Lots 9056 and 9280, 2 kilometres northeast of Nelway, within the western belt. A dolomite bed striking 137° and dipping 35° southwest outcrops along its north side. The dolomite thickens from a metre on the northwest corner of the hill to 100 metres 0.4 kilometre to the west. Much of the limestone is underlain by this dolomite bed.

Purex Lime Company attempted to develop the limestone deposit.

The company drilled two core holes in 1955, but no further work followed. Drilling intersected white to dark grey, occasionally argillaceous limestone beds, with some interbedded argillite. Pyrite content was negligible. Hole 1, drilled from the top of the hill in an easterly direction at -40°, intersected 29 metres of white, granular limestone starting at a depth of 68.6 metres. A sample taken from this section at 82.3 metres contained 55.6 per cent CaO, 0.4 per cent MgO and 0.6 per cent insolubles. This hole bottomed in 15 metres of dolomite starting at 133.5 metres depth. A sample of the dolomite taken at 136.5 metres contained 31.0 per cent CaO, 21.4 per cent MgO and 0.80 per cent insolubles (Peck and Fyles, 1955, p. 95).

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Peck, J.W. and Fyles, J.T. (1955): Purex Lime Co. Ltd.; Minister of Mines Report, pages 94-95.

LARDEAU GROUP

The Lardeau Group consists of a thick sequence of gneiss, schist phyllite, argillite, amphibolite and quartzite with minor limestone, ranging from Middle Cambrian to possibly Mississippian in age. It is underlain by the Lower Cambrian Badshot Formation and unconformably overlain by various units, such as the Mississippian Milford Group. Some outcrops of the Badshot limestone were initially included with the Lardeau Group (Cairnes, 1934; Rice, 1941).

The distribution of the Lardeau Group is similar to the Badshot Formation. It outcrops on either side of Kootenay Lake and from the north end of Kootenay Lake northwestward to north of Revelstoke on the east side of the Columbia River. A second belt extends northwestward from Trout Lake to the north end of Upper Arrow Lake.

Limestone (marble) occurs sporadically in the lower part of the Lardeau Group, as in the Index Formation, in beds commonly less than 1 metre to 30 metres thick. The limestone is massive to thinly bedded, coarse to fine-grained and white to grey to black. The rock is siliceous and argillaceous in places. Mica, garnet and epidote are sometimes present in the limestone.

Dolomite is uncommon in the Lardeau Group; the only notable occurrence is a bed of massive, buff-weathering, grey, fine-grained dolomite 15 to 30 metres thick outcropping northeast of Trout Lake (Fyles and Eastwood, 1962, p. 21).

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Fyles, J.T. (1964): Geology of the Duncan Lake Area, Lardeau District, British Columbia; Bulletin 49, pages 25-30.

Fyles, J.T. and Eastwood, G.E.P. (1962): Geology of the Ferguson Lake Area, Lardeau District, British Columbia; Bulletin 45, pages 19-22.

Höy, T. (1980): Geology of the Riondel Area, Central Kootenay Arc, Southeastern, British Columbia; Bulletin 73, pages 27-28.

Geological Survey of Canada:

Bancroft, M.F. (1929): Lardeau Area; Map 235A.

Cairnes, C.E. (1934): Slocan Mining Camp, British Columbia; Memoir 173, pages 32-34.

Reesor, J.E. (1957): Lardeau (East Half), Kootenay District, British Columbia; Map 12-1957.

Reesor, J.E. (1972): Geology of the Lardeau Map-area, East Half, British Columbia; Memoir 369, pages 59-61 and accompanying Map 1326A.

Reesor, J.E. (1982): Kaslo; Open File 929.

Rice, H.M.A. (1941): Nelson Map Area, East Half; Memoir 228, pages 21-22 and accompanying Map 603A.

Walker, J.F. (1930): Lardeau Map-area, British Columbia, General Geology; Memoir 161, pages 10-11, 114.

Wheeler, J.O. (1962): Rogers Pass Map Area, British Columbia; Paper 62-32, pages 7-8 and accompanying Map 43-1962.

Wheeler, J.O. (1965): Big Bend Map Area, British Columbia; Paper 64-32, page 12 and accompanying Map 12-1964.

Sidmouth NTS: 82K/12W
MINFILE No.: 82KNW226 Latitude: 50°43'30"
Map No.: L171 Longitude: 117°57'30"

Limestone outcrops on the east side of the Columbia River (Upper Arrow Lake) near the mouth of Wallace Creek, northeast of Sidmouth.

A bed of limestone at least 30 metres thick is exposed for 400 metres along the steep mountain side. The limestone and overlying dark green amphibolite schist strike 170° and dip 35° to 50° east. A well-developed set of joints strikes 040° and dips 80° northwest, while a second set strikes 120° and dips 80° northeast.

The bed contains fine to coarse-grained, mostly white limestone with some sporadic bluish grey banding and brownish streaks developed parallel to the stratification. A band of yellowish magnesian limestone 1.2 metres thick is developed near the centre of the bed. The rest of the rock is high calcium in composition. Analyses reported by McCammon (1968) and Goudge (1944) are in Table 27.

An unsuccessful attempt was made to quarry the limestone for stucco chips sometime between 1944 and 1968.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1968): field notes 1968 - Block 3; in Industrial Mineral File.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 206-207.

Parks, W.A. (1917): Report on the Building and Ornamental Stones of Canada; Report 452, Volume 5, pages 139-140.

Proctor (B & P Lime) NTS: 82F/10W
MINFILE No.: 82FNE155 Latitude: 49°37'13"
Map No.: L172 Longitude: 116°55'27"

Limestone was once mined underground by Cominco Ltd. as a source of flux beside the Canadian Pacific Railway, 2.4 kilometres east of Proctor, on the west shore of Kootenay Lake.

A bed of limestone 9 to 15 metres thick and enclosed in schist, outcrops along the railway track and continues up the steep mountainside west of the lake. The bed strikes 025° and dips 30° northwest.

The limestone is coarse to fine-grained and white to bluish white in colour. The rock is comprised largely of calcium limestone with some thin beds of dolomite. The limestone is cut by some veins of white quartz. An analysis reported by Goudge (1944) is in Table 27.

The deposit was explored underground by 490 metres of drifting by Cominco Ltd. between 1935 and 1938. A total of 6900 tonnes of limestone were mined during this development work. In 1960 the property was leased to B & P Lime Development, which mined 318 tonnes.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McDonald, J.D. and McCammon, J.W. (1960): B & P Lime Development; Minister of Mines Report, page 145.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 198, 202.

TABLE 27
ANALYSES OF LARDEAU LIMESTONES

Deposit	Map No.	ID	CaO %	MgO %	SiO_2 %	Al_2O_3 %	Insol. %	R_2O_3 %	Fe_2O_3 %	MnO %	P_2O_5 %	S %	LOI %	H_2O %
Sidmouth	L171	1	55.06	0.24			0.65	0.25	0.15	0.02	0.02	0.070	43.62	0.01
		2	54.52	0.99	0.36	0.24			0.12			trace		
Proctor	L172	3	44.18	7.34	5.61	0.20			0.26			0.020		

Notes

1. Composite of chips taken at 1.5 m intervals across 18 m quarry face (McCammon, 1968).
2. Sample across full width of the limestone bed but excluding the band of magnesian limestone (Goudge, 1944, p. 207, Sample 78).
3. Composite of random chips from underground workings (Goudge, 1944, p. 202, Sample 68).

SANDPILE GROUP

In the McLeod Lake area the Upper Ordovician to Middle Silurian Sandpile Group is comprised mostly of silty dolomite and limestone with some interbedded quartzite, calcareous shale and siltstone. It is confined to several belts extending southeastward from McLeod Lake and the Crooked River, west of the Parsnip River. At Pine Pass the group contains some 360 metres of carbonate. The limestone is typically dark grey to black and occasionally siliceous and contaminated by chert.

Selected Bibliography

Geological Survey of Canada:

Armstrong, J.E., Tipper, H.W., Hoadly. J.W. and Muller, J.E. (1962): McLeod Lake, British Columbia; Map 2-1962.

Armstrong, J.E., Tipper, H.W., Hoadly. J.W. and Muller, J.E. (1969): McLeod Lake, British Columbia; Map 1204A.

Redrocky Creek NTS: 93J/10E
MINFILE No.: 93J 015 Latitude: 54°37'56"
Map No.: L173 Longitude: 122°42'16"

Limestone is exposed for 365 metres along a north-trending bluff up to 90 metres high between the John Hart Highway (Highway 97) and the Westcoast Transmission pipeline, north of Redrocky Creek, 80 kilometers north of Prince George. The deposit lies near the north end of a fault-bounded belt of the Sandpile Group 25 kilometres long and up to 4 kilometres wide. Banding (bedding ?) at the bluff strikes northwest and dips gently northeast.

The limestone is comprised of numerous rounded and ellipsoidal nodules, 1 to 10 millimetres in diameter, of secondary origin (?) resembling oolites, in a fine-grained, brown-weathering, dark grey to black matrix. The nodules are composed of calcite with minor dolomite and iron oxide. The limestone is well fractured and cut by abundant white calcite stringers. Occasional grains of quartz and pyrite are present. An analysis reported by McCammon (1957) is in Table 28. Reserves are estimated at 9.1 million tonnes with the following range in composition: 52.5 - 53.8 per cent CaO, 0.4 - 0.8 per cent MgO, 1.5 - 2.0 per cent insolubles and 1.0 - 1.4 per cent $Al_2O_3 + Fe_2O_3$ (Jory, 1972, pp. 11, 12). The production of this purer limestone would require selective mining, because of its irregular distribution within the deposit.

This deposit was assessed by Calox Industries Ltd. in the late 1960s and early 1970s. A small amount of limestone was quarried by the company in 1968. The deposit was further developed by Tri-Lime Resources Ltd. in the early 1980s, with the intention of producing limestone for agricultural markets. Production began in 1983 but continued for only a short while. By September, 1983 the company was in receivership.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Calox Industries Ltd. (1973): unpublished drill sections in Industrial Mineral File.

Hora, Z.D. (1979): correspondence in Industrial Mineral File.

Hora, Z.D. (1979): memorandum in Industrial Mineral File.

Hora, Z.D. (1986): New Developments in Industrial Minerals; in Geological Fieldwork 1985, Paper 1986-1, page 240.

Jory, L.T. and Howey, H.O. (1972): Redrocky Creek Limestone Deposit, Redrocky Creek, B.C. - Summary Report; unpublished report for Dolmage Campbell & Associates Ltd. in Industrial Mineral File.

McCammon, J.W. (1957): Limestone in the Prince George and Dawson Creek Areas; Minister of Mines Report, pages 85-86.

McCammon, J.W. (1970): Redrocky Creek Quarry; in Geology, Exploration and Mining in British Columbia 1969, page 395.

Angusmac (McLeod Lake) NTS: 93J/10E
MINFILE No.: 93J 017 Latitude: 54°37'42"
Map No.: L174 Longitude: 122°37'54"

A logging road-cut 4 kilometres east of the John Hart Highway (Highway 97), 5 kilometres northeast of Angusmac, exposes thinly bedded, fossiliferous black limestone that strikes north and dips nearly vertical. The exposure lies near the southwestern edge of a belt of the Sandpile Group 1.5 kilometres wide that trends northwest for at least 40 kilometres. An analysis reported by McCammon (1965) is given in Table 28.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1965): McLeod Lake; Minister of Mines Report, pages 265-266.

PEND d'OREILLE SEQUENCE

The Pend d'Oreille sequence consists of a thick, complexly deformed succession of phyllite, argillite, quartzite, chert, limestone and greenstone of Silurian (?) to Carboniferous age outcropping on either side of the

TABLE 28
ANALYSES OF SANDPILE AND PEND D'OREILLE LIMESTONES

Deposit	Map No.	ID	CaO %	MgO %	SiO_2 %	Al_2O_3 %	Insol. %	R_2O_3 %	Fe_2O_3 %	MnO %	P_2O_5 %	S %	LOI %	H_2O %
Redrocky Creek	L173	1	53.82	0.38			2.80	0.36	0.21	0.005	0.03	0.02	42.61	0.08
Angusmac	L174	2	50.52	3.05			2.53	0.76	0.14	nil	0.010	0.005	43.04	0.02
Pend d'Oreille R.	L175	3	52.9	2.36			0.84							
		4	53.8	1.83			0.56							

Notes

1. Composite of chips taken at 3 m intervals across 183 m at the base of the bluff (McCammon, 1957, p. 86).
2. Chip sample along 45 m of road-cut (McCammon, 1965, p. 266, Sample 2).
3. Composite of chips taken at random over 4 m2 along limestone bluffs near the Nelway-Waneta road, 320 m west of Charbonneau Creek (Fyles, 1956, Sample 9230).
4. Composite of chips taken at random over 4 m2 along limestone bluffs 700 m east of Charbonneau Creek (Fyles, 1956, Sample 9231).

Pend d'Oreille River near the U.S. border. The unit commonly contains beds of grey-weathering black limestone interbedded with black argillite. The only carbonate of any significance is a massive, light grey limestone bed described below.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Fyles, J.T. and Hewlett, C.G. (1959): Stratigraphy and Structure of the Salmo Lead-zinc Area; Bulletin 41, pages 37-38.

Geological Survey of Canada:

Little, H.W. (1965): Salmo, British Columbia; Map 1145A.

Little, H.W. (1982): Geology of the Rossland-Trail Map-area, British Columbia; Paper 79-26, pages 8-9 and accompanying Map 1504A [Little, H.W. and Thorpe, R.I. (1982)].

Little, H.W. (1985): Geological Notes, Nelson West Half Map Area; Open File 1195, pages 9-10.

Pend d'Oreille River NTS: 82F/03W, 04E
MINFILE No.: 82FSW292 Latitude: 49°02'49"
Map No.: L175 Longitude: 117°28'55"

A band of limestone 120 to 900 metres wide trends east-northeast along the north side of the Pend d'Oreille River for 7.9 kilometres. It dips approximately 50° south and is estimated to be 150 to 600 metres thick.

The unit is generally composed of massive, light grey, white to light blue weathering limestone that is commonly siliceous. In places buff-weathering dolomite masses up to a hundred metres in diameter are present. Analyses reported by Fyles (1956) are in Table 28.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Fyles, J.T. (1956): March memorandum in Industrial Mineral File.

Fyles, J.T. and Hewlett, C.G. (1959): Stratigraphy and Structure of the Salmo Lead-zinc Area; Bulletin 41, pages 37-38.

McCammon, J.W. (1959): Limestone in the West Kootenay Area; Minister of Mines Report, page 173.

ANARCHIST GROUP

The Anarchist Group is a Carboniferous or older sequence of mostly amphibolite, greenstone, schist, chert and quartzite with minor limestone and rare dolomite. Most of the group is irregularly distributed in an area bounded to the west by the Okanagan River and Osoyoos Lake and to the east by the Granby River, lying within 25 kilometres of the U.S. border. The group is also exposed west of Lower Arrow Lake on Franklin Mountain and east of the Kettle River near Beaverdell. Its erratic distribution is the result of extensive faulting and numerous intrusions.

Carbonates occur as lenses and beds generally up to 90 metres thick. The limestones are light grey to black and thin-bedded to massive. Major deposits occur on Lime Creek (Thimble Mountain), on the southwest flank of Franklin Mountain, on the west slope of Mount Attwood and in the vicinity of Boundary Falls.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Church, B.N. (1986): Geological Setting and Mineralization in the Mount Attwood - Phoenix Area of the Greenwood Mining Camp; Paper 1986-2.

Geological Survey of Canada:

Drysdale, C.W. (1915): Geology of the Franklin Mining Camp; Memoir 56, pages 51-55, 97, 99 with accompanying Map 97A.

Little, H.W. (1957): Kettle River (East Half), Similkameen, Kootenay and Osoyoos Districts, British Columbia, Map 6-1957.

Little, H.W. (1961): Geology of Kettle River (West Half) Map Sheet; Map 15-1961.

Little, H.W. (1983): Geology of the Greenwood Map-area, British Columbia; Paper 79-29, pages 7-8 and accompanying Map 1500A [Greenwood, British Columbia; Little, H.W., Thorpe, R.I. and Monger, J.W.H. (1983)].

Tempelman-Kluit, D.J. (1989a): Geology of Penticton, British Columbia; Map 1736A.

Tempelman-Kluit, D.J. (1989b): Geological Map with Mineral Occurrences, Fossil Locations, Radiometric Ages and Gravity Field for Penticton Map Area (NTS 82E), Southern British Columbia; Open File 1969.

Lime Creek (Thimble Mountain) NTS: 82E/01W
MINFILE No.: 82ESE237 Latitude: 49°08'57"
Map No.: L176 Longitude: 118°27'30"

A mass of limestone outcrops on the northeast slope of Thimble Mountain, 10.7 to 13.9 kilometres north of Grand Forks. The lens is exposed on the road west of the Granby River and continues south-southwest up the mountainside for 3.2 kilometres. Exposed widths vary up to 1000 metres.

The deposit is comprised mostly of dark bluish grey to light grey, fine-grained, thin-bedded limestone containing chert nodules.

The limestone is cut buy numerous white calcite stringers and frequently intruded by dikes. Near the dikes the rock is recrystallized to medium-grained marble. Some discontinuous layers and lenses of volcanic rocks are present within the limestone. An analysis reported by McCammon (1960) is in Table 29.

A small quarry is situated west of the road, 180 metres south of Lime Creek at an elevation of 700 metres. It was operated sometime before 1944 as a source of marble.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1960): Limestone in the Greenwood - Grand Forks Area; Minister of Mines Report, pages 140-143.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 194, 202.

Boundary Falls Limestone NTS: 82E/02E
MINFILE No.: 82ESE226 Latitude: 49°03'08"
Map No.: L177 Longitude: 118°41'13"

A limestone lens 110 metres long and up to 40 metres thick outcrops on a hillside 0.8 kilometre northeast of Boundary Falls, about 90 metres above the town. The lens is enclosed in sheared greywacke. The limestone strikes 060° and dips 58° northeast.

The deposit is comprised of white and bluish grey streaked medium-grained limestone. An analysis reported by McCammon (1960) is in Table 29.

TABLE 29
ANALYSES OF ANARCHIST AND MILFORD LIMESTONES

Deposit	Map No.	ID	CaO %	MgO %	SiO_2 %	Al_2O_3 %	Insol. %	R_2O_3 %	Fe_2O_3 %	MnO %	P_2O_5 %	S %	LOI %	H_2O %
Lime Creek	L176	1	48.76	0.88			10.16	0.62	0.56	0.05	0.14	0.04	39.41	0.06
Boundary Falls Lst.	L177	2	55.15	0.23			0.68	0.16	0.14	0.01	0.13	0.01	43.55	0.08
Ainsworth	L178	3	47.17	6.66			1.06	0.48	0.17	0.12	0.04	0.003	44.76	
		4	45.80	7.17			1.02	1.38	0.57	0.57	0.06	0.004	44.64	
		5	55.22	0.29			0.24	0.18	0.04	0.03	0.05	0.005	43.78	
		6	44.65	9.49			0.34	0.14	0.03	trace	0.04	0.003	45.53	
		7	54.51	1.12			0.24	0.06	0.01	trace	0.02	0.003	44.17	
		8	54.0	1.43			0.30	0.06	0.02	trace	0.02	0.003	43.98	

Notes

1. Composite of chips taken at random along 213 m of limestone in a road-cut at the north end of the lens (McCammon, 1960, p. 143, Sample 9).
2. Chip sample across 30 m near the centre of the lens (McCammon, 1960, p. 143, Sample 3).
3. Sample of chips taken at 30 cm intervals perpendicular to bedding across 1.8 m of limestone (Fyles, 1961, Sample 943).
4. Sample of chips taken at 30 cm intervals perpendicular to bedding across 4.5 m of limestone following previous sample (Fyles, 1961, Sample 944).
5. Sample of chips taken at 30 cm intervals perpendicular to bedding across 2.4 m of limestone following previous sample (Fyles, 1961, Sample 945).
6. Sample of chips taken at 30 cm intervals perpendicular to bedding across 4.5 m of limestone (Fyles, 1961, Sample 946).
7. Sample of chips taken at 30 cm intervals perpendicular to bedding across 2.4 m of limestone (Fyles, 1961, Sample 947).
8. Sample of chips taken at 30 cm intervals perpendicular to bedding across 4.5 m of limestone (Fyles, 1961, Sample 948).

A small quarry has been opened up on the southwest side of the deposit. The limestone was burnt in an adjacent kiln sometime previous to 1944.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1960): Limestone in the Greenwood - Grand Forks Area; Minister of Mines Report, pages 140-143.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, page 193.

Boundary Falls Dolomite NTS: 82E/02E
MINFILE No.: 82ESE227 Latitude: 49°02'47"
Map No.: D009 Longitude: 118°41'47"

A lens of fine-grained, cream to pale blue, mottled and streaked dolomite enclosed in greenstone forms a small elongate hill, 15 metres west of the Canadian Pacific Railway, 180 metres north of the sawmill at Boundary Falls. The deposit is 52 metres long and 18 metres wide.

A small quarry is situated in the south end of the deposit. The dolomite was burnt in an adjacent lime kiln before 1944.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1960): Limestone in the Greenwood - Grand Forks Area; Minister of Mines Report, pages 140-143.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, page 193.

MILFORD GROUP

The Milford Group is comprised of argillite, slate, schist and quartzite with minor chert, greenstone, limestone and dolomite of Mississippian age, unconformably overlying the Lardeau Group. The sequence outcrops as a narrow, discontinues fault-bounded belt trending northward along the west side of Kootenay Lake and continuing northwestward to Trout Lake and beyond to the north end of Upper Arrow Lake.

Carbonate units are found throughout the Milford Group. Limestone occurs in beds and lenses commonly up to 120 metres thick. Between Trout Lake and Upper Arrow Lake a discontinuous limestone unit lying near the base of the group is reported to vary from a few metres to a thousand metres in thickness (Read, 1975). Dolomite occurs less commonly in thin beds of limited extent.

The limestones are typically fine-grained, dark grey to black, banded to massive, carbonaceous and platy. In a few instances, such as south of Kaslo, they are recrystallized and light grey to white in colour. Micaceous partings, lenses of schist and dark grey to black siliceous layers are widespread but minor. Dolomite is usually light to dark grey and occasionally contaminated with metamorphic minerals. One prominent bed of light grey to white, crystalline dolomite 3 to 9 metres thick has been traced northward from Cedar Creek ("Libby member," Fyles, 1967, p. 25).

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Fyles, J.T. (1967): Geology of the Ainsworth-Kaslo Area, British Columbia; Bulletin 53, pages 24-25, 30-33.

Geological Survey of Canada:

Bancroft, M.F. (1929): Lardeau Area; Map 235A.

Cairnes, C.E. (1934a): Slocan Mining Camp, British Columbia; Memoir 173, page 41.

Cairnes, C.E. (1934b): Sandon Sheet; Map 273A.

Read, P.B. (1975): Geological and Mineral Deposit Maps of Lardeau (West Half); Open File 288.

Read, P.B. (1977): Mineral Deposits, Lardeau, West Half; Open File 464.

Read, P.B. (1978): Geology of Lardeau, West Half; Open File 432.

Reesor, J.E. (1982): Kaslo; Open File 929.

Rice, H.M.A. (1941): Nelson Map-area, East Half; Memoir 228, pages 30-31 and accompanying Map 603A.

Walker, J.F. and Bancroft, M.F. (1930): Lardeau Map-area, British Columbia, General Geology; Memoir 161, pages 12-14.

Ainsworth
(Lendrum Creek) NTS: 82F/15W, 10W
MINFILE No.: 82FNE156 Latitude: 49°46'07"
Map No.: L178 Longitude: 116°56'31"

Various beds of limestone outcrop for 18 kilometres along the west side of Kootenay Lake near Ainsworth, between Bjerkness Creek to the north and Coffee Creek

to the south. At Lendrum Creek, 5 kilometres northwest of Ainsworth, they strike approximately 175° and dip 29° to 50° west. To the east they are intercalated with folded phyllite and mica schist.

Near Lendrum Creek the beds are comprised of very fine grained, dark to light grey, locally white limestone. In a few places sections of clean limestone contain sheets of felsite up to a metre thick. Analyses of samples taken by Fyles (1961) along logging roads south of Lendrum Creek are given in Table 29.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Fyles, J.T. (1961): December memorandum in Industrial Mineral File.

Fyles, J.T. (1967): Geology of the Ainsworth-Kaslo Area, British Columbia; Bulletin 53, pages 18, 24.

McCammon, J.W. (1959): Limestone in the West Kootenay Area; Minister of Mines Report, page 172.

SLIDE MOUNTAIN GROUP

The Slide Mountain Group forms an irregular belt of basaltic flows and pyroclastics, argillite, slate, chert, sandstone and limestone of Mississippian to Triassic age trending southeastward from the south end of Williston Lake for 270 kilometres to just east of Barkerville. Significant limestone deposits occur west of Williston Lake, on the west side of McLeod Lake, 5 kilometres northwest of Purden Lake and 5 kilometres east-southeast of Giscome. The deposit near Giscome (MINFILE No. 093J 025) is being quarried by Kode-Jerrat Quarries Ltd. for pulp mills at McKenzie and Quesnel. This limestone is reported to grade at least 98 per cent calcium carbonate (G. Klein, 1991, personal communication).

Selected Bibliography

Geological Survey of Canada:

Armstrong, J.E., Tipper, H.W., Hoadly. J.W. and Muller, J.E. (1969): McLeod Lake, British Columbia; Map 1204A.

Campbell, R.B., Mountjoy, E.W. and Young, F.G. (1973): Geology of the McBride Map-area, British Columbia; Paper 72-35, pages 59-60 and accompanying Map 1356A.

Muller, J.E. (1961): Pine Pass, British Columbia; Map 11-1961.

Tipper, H.W., Campbell, R.B., Taylor, G.C. and Stott, D.F. (1979): Parsnip River, British Columbia; Map 1424A.

McKenzie
(Bend and LST Claims)

MINFILE No.: 93O 039 — NTS: 93O/03E
Map No.: L179 — Latitude: 55°10'17" Longitude: 123°11'57"

Limestone was quarried 2 kilometres southwest of Williston Lake, 1.3 kilometres northwest of Lignite Creek by Knox Western Capital Inc. The quarry is developed in a 110 by 60 metre outcrop projecting 130 metres above the surrounding overburden, just west of the McLeod fault. The outcrop is comprised of a bed of clean, buff-coloured, chemical-grade limestone 50 metres thick with some argillaceous carbonate, overlain and underlain by siliceous and dolomitic limestone. The contact with the overlying impure limestone strikes 133° and dips 28° southwest. A fault of similar orientation cuts through the middle of the purer limestone bed. Mapping, surface sampling and diamond drilling have defined 300 000 tonnes of economically recoverable limestone averaging 55.06 per cent CaO, 0.41 per cent MgO, 0.17 per cent SiO_2, 0.46 per cent Al_2O_3 and 0.17 per cent Fe_2O_3 (MacLeod, 1988, p. 2).

The limestone was initially quarried by B.C. Forest Products Ltd. as riprap for a causeway across the south end of Williston Lake, sometime prior to 1986. Knox Western Capital Inc. began quarrying limestone in 1988 to supply paper mills at McKenzie and Quesnel. A total of 33 000 tonnes was quarried on a seasonal basis during 1988 and 1989. The company did not resume quarrying operations in 1990 due to financial difficulties.

Continental Gold Ltd. recently staked the LST claims to cover limestone outcropping near the Knox Western's inactive quarry. The outcrops were sampled by the company in 1990 during a search for local sources of limestone for acid neutralization at the company's proposed copper-gold mine at Mount Milligan to the west.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

MacLeod, W.A. (1986): Geological Report and Proposed Diamond Drilling Program, Bend Mineral Claims; unpublished report in Industrial Mineral File.

MacLeod,. W.A. (1988): Application to Open a Quarry, McKenzie Limestone; in Industrial Mineral File.

KNOB HILL GROUP

The Knob Hill Group contains massive chert, greenstone and amphibolite with minor argillite of Carboniferous or Permian age, outcropping largely in the Greenwood map are (82E/02), between the Kettle River to the west and the Granby River to the east. Limestone occurs as small pods on Knob Hill, 4 kilometres east of Greenwood and as larger, mappable bodies in a belt of Knob Hill rocks extending northward from the U.S. border for 15 kilometres, crossing the Kettle River at Rock Creek.

The limestone is light grey in colour and occasionally accompanied by pods of bedded chert. The rock is dolomitic in a few instances.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Church, B.N. (1986): Geological Setting and Mineralization in the Mount Attwood - Phoenix Area of the Greenwood Mining Camp; Paper 1986-2.

Geological Survey of Canada:

Little, H.W. (1983): Geology of the Greenwood Map-area, British Columbia; Paper 79-29, page 11 and accompanying map 1500A [Greenwood, British Columbia; Little, H.W., Thorpe, R.I. and Monger, J.W.H. (1983)].

Tempelman-Kluit, D.J. (1989a): Geology of Penticton, British Columbia; Map 1736A.

Tempelman-Kluit, D.J. (1989b): Geological Map with Mineral Occurrences, Fossil Locations, Radiometric Ages and Gravity Field for Penticton Map Area (NTS 82E), Southern British Columbia; Open File 1969.

Rock Creek Dolomite
(Dolo Claim)

NTS: 82E/02W
MINFILE No.: 82ESE200 Latitude: 49°01'13"
Map No.: D010 Longitude: 118°57'57"

A dolomite lens outcrops over a 100 by 100 metre area along the top of a knoll on the southeast portion of Lot 446S, 4.5 kilometres south-southeast of the community of Rock Creek. The lens is embedded largely in hornblende gneiss (amphibolite). An irregular band of talc-chlorite schist lies along the hangingwall contact. Bedding strikes 157° to 180° and dips 40° to 80° east. A schistosity strikes 150° and dips 30° to 50° west.

The lens contains massive, fine to very fine-grained, white dolomite with scattered grains, patches and veinlets of quartz and a trace of talc. A band of gneiss 2 to 10 metres thick lies within the deposit. Various analyses are given in Table 30. The deposit is estimated to contain 15.4 million tonnes of proven (measured geological) reserves and 9.0 million tonnes of probable (indicated) reserves (Financial Post Review of Mines 1972, p. 214).

The property was first operated on an intermittent basis by New Dolomite Mines Ltd. between 1972 and 1977. Dolowhite Mines Ltd. continued quarrying dolomite from 1978 to 1982. Mighty White Dolomite Ltd. currently operates the quarry, producing crushed dolomite for agricultural, landscaping and decorative purposes. Between 1972 and 1988 60 000 tonnes of dolomite were quarried.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Hora, Z.D. (1978): unpublished report on the Rock Creek dolomite property in Industrial Mineral File.

McCammon, J.W. (1972): Dolo; in Geology, Exploration and Mining in British Columbia 1971, page 456.

TABLE 30
ANALYSES OF KNOB HILL AND MOUNT ROBERTS LIMESTONES

Deposit	Map No.	ID	CaO %	MgO %	SiO_2 %	Al_2O_3 %	Insol. %	R_2O_3 %	Fe_2O_3 %	MnO %	P_2O_5 %	S %	LOI %	H_2O %
							TiO_2**	K_2O**				Na_2O**		
Rock Creek	D010	1	30.90	19.30	5.90	0.26	0.02	0.10	0.13	0.02	0.05	0.02	41	
		2	30.73	18.16			6.55	0.32	0.13	0.01	0.003	0.015*	44.04	0.01
File	L180	3	52.78	0.30			4.64	0.20	0.17	0.02	0.016	0.02	41.94	0.02
		4	51.0	0.3	6.5	0.1			0.3				41.5	
Broadwater	L181	5	51.55	0.35			6.62	0.26	0.20	0.045	0.016	0.03	41.06	0.13

Notes

1. Sample of dolomite quarried in 1987 (P. Chaput, personal communication, 1989).
2. Average of two samples of crushed dolomite from stockpile (McCammon, 1972, p. 456).
3. Sample across 27.4 m along the face of the southernmost of two quarries east of the C.P.R. track (McCammon, 1959, p. 173, Sample 6).
4. Representative analysis of material quarried in the early 1940s (Goudge, 1944, p. 197).
5. Sample across entire lakeside exposure (McCammon, 1959, p. 173, Sample 7).

**Value reported under S is SO_3.*
***Refers only to values immediately following.*

MOUNT ROBERTS FORMATION

The Mount Roberts Formation is comprised of schist, slate, greywacke, greenstone, limestone and gneiss of Pennsylvanian and possibly Permian age, exposed in several belts trending northeastward from the east side of Christina Lake. The longest of these extends discontinuously for 30 kilometres to the Columbia River, north of Rossland. The unit also occurs on either side of Lower Arrow Lake near Renata, Dear Park and Broadwater. Smaller outcrops are also situated just west and south of Rossland. Significant limestone beds occur at Fife on Christina Lake and at Broadwater on the east shore of Lower Arrow Lake.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Fyles, J.T. (1984): Geological Setting of the Rossland Mining Camp; Bulletin 74, pages 13-15.

Geological Survey of Canada:

Little, H.W. (1957): Kettle River (East Half), Similkameen, Kootenay and Osoyoos Districts, British Columbia, Map 6-1957.

Little, H.W. (1982): Geology of the Rossland-Trail Map-area, British Columbia; Paper 79-26.

Tempelman-Kluit, D.J. (1989a): Geology of Penticton, British Columbia; Map 1736A.

Tempelman-Kluit, D.J. (1989b): Geological Map with Mineral Occurrences, Fossil Locations, Radiometric Ages and Gravity Field for Penticton Map Area (NTS 82E), Southern British Columbia; Open File 1969.

Fife (Christina Lake) NTS: 82E/01E
MINFILE No.: 82ESE238 Latitude: 49°04'18"
Map No.: L180 Longitude: 118°12'21"

A vertically dipping bed of limestone outcrops along Highway 3 on Christina Lake, 0.8 kilometres north of the Fife cut-off road, and continues north-northeast up the hillside for at least 3.2 kilometres. The bed thickens from 27 metres along the highway to 240 metres, 1.5 kilometres northeast.

The bed contains medium to fine-grained, bluish grey to white, banded limestone that is intensely fractured and sheared. Nodules and lenses of blue chert and streaks of rusty and siliceous limestone contaminate this deposit. The siliceous limestone tends to occur near the contacts with the enclosing volcanics. Contorted mafic dikes intrude the limestone. Analyses reported by Goudge (1944) and McCammon (1959) are in Table 30.

Limestone was produced from four major quarries and several smaller quarries and glory holes on both sides of the Canadian Pacific Railway, 0.8 to 1.6 kilometres north of Fife, between 1911 and 1957. A total of 1.55 million tonnes of limestone was produced and used for flux at the Cominco smelter in Trail.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1959): Limestone in the West Kootenay Area; Minister of Mines Report, page 173.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 196-197.

Parks, W.A. (1917): Report on the Building and Ornamental Stones of Canada; Report 452, Volume 5, pages 148-149.

Broadwater NTS: 82E/08E
MINFILE No.: 82ESE211 Latitude: 49°28'02"
Map No.: L181 Longitude: 118°05'07"

A band of limestone outcrops on the east side of Lower Arrow Lake, 0.8 kilometre south of the Broadwater Post Office. It continues eastward up the mountainside for at least 400 metres and possibly up to 8 kilometres. The band is 150 metres wide on the lake. Bedding strikes 065° and dips 55° southeast.

The band consists of medium to coarse-grained, grey and white thin-bedded limestone containing some silicates and pyrite. Argillite interbeds occur on the south side of the deposit. Numerous randomly orientated dikes intrude the limestone on the north side. An analysis reported by McCammon (1959) is given in Table 30.

A small quarry was opened up on the deposit near the lake shore 46 metres from the southern edge of the limestone band. The limestone was used to manufacture lime sometime before 1940.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1959): Limestone in the West Kootenay Area; Minister of Mines Report, pages 173-174.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 206-207.

SICAMOUS FORMATION

The Sicamous Formation is comprised of two limestone members separated by a calcareous sericite schist member, all of approximately equal thickness. The exact age of the unit is unknown, but a Mesozoic age has been suggested. The general lack of limestones in strata younger than Jurassic within the Canadian Cordillera suggests the unit may therefore be middle to lower Mesozoic in age. The sequence is estimated to vary from 2000 to 3000 metres in thickness. The formation outcrops in an irregular belt beginning in the Larch Hills west of Mara Lake and continuing west-northwest across the Salmon Arm and west arm of Shuswap Lake to the south end of Adams Lake.

The limestone is generally impure, platy, fine grained and dark grey to black. Partings are commonly coated with mica or graphite. The rock is usually interbedded with white to brownish orange, coarse-grained calcite lenses and layers. Lenses and small pods of white quartz are also evident.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1960): Limestone in the Salmon Arm Area; Minister of Mines Report, page 143.

Geological Survey of Canada:

Jones, A.G. (1959): Vernon Map-area, British Columbia; Memoir 296, pages 21-22 and accompanying Map 1059A.

Okulitch, A.V. and Campbell, R.B. (1979): Lithology, Stratigraphy, Structure and Mineral Occurrences of the Thompson-Shuswap-Okanagan Area, British Columbia; Open File 637.

Salmon Arm (Larch Hill) NTS: 82L/11E
MINFILE No.: 82LNW087 Latitude: 50°42'19"
Map No.: L182 Longitude: 119°12'02"

This deposit is situated Larch Hill, 245 metres above Highway 97B, approximately 6 kilometres east of the town of Salmon Arm. A band of limestone forms a small ridge trending 110° along the west side of the hill. The ridge is 250 metres long and 75 metres wide. The limestone appears to dip eastward into the hillside.

The ridge consists of white to bluish white, medium-grained, fractured limestone with a few thin seams of brown-weathering blue dolomite along some of the fractures. The limestone also contains some quartz veins and a few inclusions of quartzite and shale. An analysis reported by Goudge (1944) is in Table 31.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1960): Limestone in the Salmon Arm Area; Minister of Mines Report, page 143.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 187, 191.

Blind Bay (Notch Hill) NTS: 82L/14W
MINFILE No.: 82LNW064 Latitude: 50°52'47"
Map No.: L183 Longitude: 119°22'12"

Limestone outcrops along the beach on the southwest side of Blind Bay on the south shore of Shuswap Lake. It strikes 005° and dips 15° west.

The beach exposures are fine-grained, dark blue, thinly bedded, graphitic limestone with mica flakes along

TABLE 31
ANALYSES OF SICAMOUS LIMESTONES

Deposit	Map No.	ID	CaO %	MgO %	SiO_2 %	Al_2O_3 %	Insol. %	R_2O_3 %	Fe_2O_3 %	MnO %	P_2O_5 %	S %	LOI %	H_2O %
Salmon Arm	L182	1	54.83	0.35	1.32	0.21			0.14			nil		
Blind Bay	L183	2	51.78	0.75	4.04	0.59			0.66			0.060		
Grindrod	L184	3	47.53	0.57			11.80	1.28	1.22	0.04	0.03	0.09	38.72	0.24
Sorrento	L185	4	46.44	0.90			11.84	1.20	1.29	0.04	0.021	0.04	38.77	0.06

Notes

1. Sample taken across northwest end of ridge (Goudge, 1944, p. 191, Sample 51).
2. Chip sample across 3 m of limestone (Goudge, 1944, p. 191, Sample 50).
3. Sample taken along 12 m of road-cut exposure on side road 1.6 km west of Grindrod (McCammon, 1960, p. 144, Sample 2).
4. Composite of chips taken at 6 m intervals along 260 m of road-cut 3 km east of Sorrento (McCammon, 1960, p. 144, Sample 1).

bedding planes. Numerous white calcite veins and a few quartz veins 5 to 10 centimetres thick cut across the bedding. Several thin, platy masses of dark blue dolomite are exposed at one point. An analysis reported by Goudge (1944) is in Table 31.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1960): Limestone in the Salmon Arm Area; Minister of Mines Report, page 143.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 185, 187, 191.

Grindrod NTS: 82L/11E
MINFILE No.: 82LNW086 Latitude: 50°37'33"
Map No.: L184 Longitude: 119°08'57"

A mass of limestone extends northwest from Grindrod for 6.4 kilometres, varying up to 2.5 kilometres in width. It is truncated by a fault along its northeast margin and intruded by a granitic stock along its southwest flank.

Outcrops along the Grindrod-Mara road expose siliceous limestone with quartz veins and granitic dikes. A cut along a side road on a hill 1.6 kilometres west of Grindrod exposes platy, orange and black limestone with mica and graphite along partings. An analysis reported by McCammon (1960) is in Table 31.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1960): Limestone in the Salmon Arm Area; Minister of Mines Report, pages 143-144.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, page 205.

Sorrento (Notch Hill) NTS: 82L/14W
MINFILE No.: 82LNW075 Latitude: 50°52'40"
Map No.: L185 Longitude: 119°25'35"

Various exposures of limestone occur along Highway 1, 1.6 to 3 kilometres east of Sorrento. The limestone is fine-grained and dark grey. Micaceous and graphitic partings give it a platy appearance. Numerous white calcite veinlets and white quartz veins cut the rock.

Scattered patches of pyrite are also present. An analysis reported by McCammon (1960) is in Table 31.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1960): Limestone in the Salmon Arm Area; Minister of Mines Report, pages 143-144.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, page 185.

BROOKLYN FORMATION

The Brooklyn Formation consists of a lower conglomerate and siltstone member ("Rawhide member"), conformably overlain by an upper limestone member of Middle Triassic age. The limestone outcrops almost entirely in the southern half of the of the Greenwood map sheet (82E/02). The unit tends to form sporadically distributed, lenticular masses lying mostly east of Greenwood and northwest of Grand Forks in the east half of the Greenwood map sheet.

The limestone is usually massive and grey to white in colour, with sparse to moderately abundant, mostly sand-sized, rounded chert grains, especially in the lower part of the unit. The limestone sometimes contains beds of shale, argillite, siltstone and sandstone. Skarn zones, comprised of various calcium silicates, are sometimes developed in the limestone near contacts with granodioritic intrusions of the Middle Jurassic Nelson plutonic suite. The member is generally comprised of calcium to high-calcium limestone.

Selected Bibliography

Geological Survey of Canada:

Little, H.W. (1983): Geology of the Greenwood Map-area, British Columbia; Paper 79-29, pages 14-17 and accompanying Map 1500A [Greenwood, British Columbia; Little, H.W., Thorpe, R.I. and Monger, J.W.H. (1983)].

Tempelman-Kluit, D.J. (1989a): Geology of Penticton, British Columbia; Map 1736A.

Tempelman-Kluit, D.J. (1989b): Geological Map with Mineral Occurrences, Fossil Locations, Radiometric Ages and Gravity Field for Penticton Map Area (NTS 82E), Southern British Columbia; Open File 1969.

Hardy Creek
(Goat Mountain) NTS: 82E/01W, 02E
MINFILE No.: 82ESE230 Latitude: 49°03'01"
Map No.: L186 Longitude: 118°29'20"

Limestone outcrops on the limbs of a fold on Eagle and Goat Mountains, with the closure on Hardy Creek, 4 kilometres northwest of Grand Forks. One limb extends north-northwest for 1.8 kilometres toward the summit of Goat Mountain; the other extends westward for 2.2 kilometres along the south flank of Eagle Mountain.

The deposit on Eagle Mountain consists of uniform, dark grey to black, fine-grained limestone with siliceous and argillaceous inclusions. Numerous white calcite veinlets cut the limestone. On Goat Mountain the limestone is well fractured and brecciated, with white calcite healing fractures. Chert occurs as angular fragments and as discontinuous, irregular seams 2.5 to 7.5 centimetres thick. Mafic dikes are abundant in this part of the deposit. An analysis reported by McCammon (1960) is in Table 32.

A small quarry was opened on the south side of Hardy Creek, 750 metres west of the Canadian Pacific Railway, sometime previous to 1940.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1960): Limestone in the Greenwood - Grand Forks Area; Minister of Mines Report, pages 142-143.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 195, 202.

Marguerite NTS: 82E/02E
MINFILE No.: 82ESE231 Latitude: 49°07'13"
Map No.: L187 Longitude: 118°42'04"

Limestone outcrops north of the Marguerite mine, 3 kilometres northwest of Greenwood. It trends northward for 1500 metres with a width of up to 800 metres. The Greyhound Creek fault truncates the limestone to the east. A few north-northeast-trending syenite and quartz monzonite dikes intrude the limestone mass near its south end.

The limestone is massive, medium to fine grained and grey to white in colour. An intricate network of white calcite veinlets cuts the rock. Rounded, light to dark grey chert nodules and thin beds of cherty "jasperoid" are sometimes present. Analyses reported by LeRoy (1914) are in Table 32.

This limestone was burnt in a lime kiln located 50 metres northeast of the entrance of the Marguerite Mine in the early part of this century.

TABLE 32
ANALYSES OF BROOKLYN LIMESTONES

Deposit	Map No.	ID	CaO %	MgO %	SiO_2 %	Al_2O_3 %	Insol. %	R_2O_3 %	Fe_2O_3 %	MnO %	P_2O_5 %	S %	LOI %	H_2O %
Hardy Creek	L186	1	51.94	0.49			5.34	0.44	0.33	0.03	0.20	0.03	41.81	0.04
Marguerite	L187	2	53.71*	0.65*			0.32	0.10					2.46**	
		3	54.72*	0.67*			0.40	0.20					0.33**	
Deadwood Crk.	L188	4	53.98*	0.68*			0.60	0.2					1.32**	
Oro Denoro	L189	5	51.39	0.67	5.70	0.42			0.39			0.04		
		6	48.47	0.70			11.20	1.04	0.74	0.04	0.13	0.02	38.69	0.28
Midway	L190	7	54.04	0.25			2.30	0.30	0.16	0.01	0.07	0.01	42.85	0.10
		8	52.10	0.37			6.70	0.52	0.80	0.07	0.03	0.18	40.12	0.07
Eholt	L191	9	54.27	0.18	2.58	0.04			0.38			0.01		
		10	52.40	0.38			4.94	0.38	0.32	0.03	0.04	0.03	41.75	0.09

Notes

1. Sample across 60 m of limestone 800 m southwest of Hardy Creek (McCammon, 1960, p. 143, Sample 12).
2. White crystalline limestone from Marguerite mine (LeRoy, 1914, p. 19, Sample 1).
3. Grey crystalline limestone from Marguerite mine (LeRoy, 1914, p. 19, Sample 3).
4. White crystalline limestone from 200-foot level of Mother Lode mine (Leroy, 1914, p. 19, Sample 2).
5. Sample taken from outcrop on old railroad 800 m south of Oro Denoro mine (Goudge, 1944, p. 202, Sample 60).
6. Chip sample across top of knoll 2.5 km northwest of the junction of Highway 3 and the Phoenix road (McCammon, 1960, p. 143, Sample 6).
7. Composite of random chips from outcrop (McCammon, 1960, p. 143, Sample 2).
8. Chip sample across 4.3 m of limestone exposed in a road-cut along Highway 3 (McCammon, 1960, p. 143, Sample 1).
9. Sample across bed of pure limestone on south face of the hill (Goudge, 1944, p. 202, Sample 61).
10. Composite of random chips across the top of a cliff (McCammon, 1960, p. 143, Sample 4).

**Values are calculated from $CaCO_3$ and $MgCO_3$ analyses.*
***"Undetermined compounds".*

Selected Bibliography

Geological Survey of Canada:

LeRoy, O.E. (1914): Mother Lode and Sunset Mines, Boundary District, British Columbia; Memoir 19, pages 17-19.

Deadwood Creek (Mother Lode) NTS: 82E/02E
MINFILE No.: 82ESE228 Latitude: 49°06'46"
Map No.: L188 Longitude: 118°43'00"

A steeply dipping limestone mass outcrops north of the Mother Lode mine, 3.5 kilometres northwest of Greenwood. It extends 1100 metres north-northwest from Deadwood Creek and varies up to 400 metres in width. A small stock of the Nelson plutonic suite cuts the limestone mass near its south end.

The deposits consist of massive, irregularly jointed, medium to fine-grained, grey to white limestone, that is cut by numerous white calcite veinlets. Rounded, light to dark grey chert nodules and thin beds of cherty "jasperoid" are sometimes present. Pyrite occurs in trace amounts. Actinolite, garnet, epidote and other calcium silicates replace some of the limestone near its south end in the vicinity of the Mother Lode mine. An analysis reported by LeRoy (1914) is quoted in Table 32.

Selected Bibliography

Geological Survey of Canada:

LeRoy, O.E. (1914): Mother Lode and Sunset Mines, Boundary District, British Columbia; Memoir 19, pages 17-19.

Oro Denoro NTS: 82E/02E
MINFILE No.: 82ESE232 Latitude: 49°07'19"
Map No.: L189 Longitude: 118°32'38"

A limestone lens outcrops on Highway 3, 3.5 kilometres south of Eholt, and continues south-southwest for 1.75 kilometres to the Phoenix Road, 1.6 kilometres west-northwest of the its junction with the highway. At the highway outcrop on the north end of the deposit the limestone strikes north and dips 65° east.

The lens is mostly comprised of light grey to white, fine-grained limestone with some black to dark grey limestone. Scattered thin, cherty and argillaceous beds occur within it. Streaks of disseminated pyrite are sometimes present. The beds are intruded by numerous sills and dikes. An analysis reported by Goudge (1944) is in Table 32.

A second subparallel lens of mostly white, medium-grained limestone, 2 kilometres long, outcrops 500 to 900 metres west of the first lens. Some chert beds and dikes are present within it. An analysis reported by McCammon (1960) is also in Table 32.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1960): Limestone in the Greenwood - Grand Forks Area; Minister of Mines Report, pages 141, 143.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 194, 202.

Midway NTS 82E/02W
MINFILE No.: 82ESE235, 82ESE210 Latitude: 49°01'11"
Map No.:L190 Longitude: 118°50'13"

Two lenses of limestone are exposed northwest of Midway. The first lens (82ESE235) outcrops on the south slope of a hill between 760 and 975 metres elevation, 4.5 kilometres west-northwest of Midway and 500 metres north of Highway 3. It trends north-northeast for approximately 700 metres and consists of medium to fine-grained, light grey limestone with many argillaceous inclusions. The analysis of a sample of randomly collected chips taken by McCammon (1960) is given in Table 32.

A second lens (82ESE210) outcrops on the Kettle River, 6.5 kilometres west-northwest of Midway and continues northeastward up the west slope of a hill for approximately 700 metres. Outcrops along Highway 3 and the Canadian Pacific Railway expose an apparent width of 600 metres of limestone. Bedding generally strikes northwest and dips northeast despite some folding and faulting.

The lens is comprised of mixed medium-grained, light grey to white limestone and fine-grained, black limestone with some interbedded greywacke, argillite and light grey chert. The limestone is bleached white along numerous fractures and intruded by a number of dikes. An analysis reported by McCammon (1960) is in Table 32.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1960): Limestone in the Greenwood - Grand Forks Area; Minister of Mines Report, pages 140, 143.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 193-202.

Eholt NTS: 82E/02E
MINFILE No.: 82ESE229 Latitude: 49°08'13"
Map No.: L191 Longitude: 118°32'44"

A limestone lens forms a hill, 120 metres high, 2 kilometres due south of Eholt. It strikes north-northeast for 600 metres and dips nearly vertical. Exposed widths vary up to 150 metres. The limestone is bounded to the west by granodiorite of the Middle Jurassic Nelson plutonic suite.

The lens consists of coarse-grained, white to pale blue, thickly bedded, high-calcium limestone that becomes siliceous and cherty towards the margins of the deposit. A few dikes intrude the limestone. An analysis reported by Goudge (1944) is given in Table 32.

A second lens of light grey, medium-grained limestone forms a steep bluff, 90 metres high, 200 metres west of Highway 3, 2.5 kilometres south of Eholt. Local concentrations of chert and other impurities are present. This was sampled by McCammon (1960); analytical data are in Table 32.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1960): Limestone in the Greenwood - Grand Forks Area; Minister of Mines Report, pages 141, 143.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 194, 202.

METAMORPHIC COMPLEXES-OMINECA BELT

The southern Omineca Belt is cored by several high-grade metamorphic complexes lying mostly between Okanagan and Kootenay Lakes to the south and between Adams Lake and the Columbia River farther north. Carbonate beds are occasionally found in the schistose and gneissic rocks of the Monashee gneiss (Shuswap metamorphic complex) and the Grand Forks gneiss.

Significant deposits of grey marble occur northwest and east of the community of Blue River, within the Monashee gneiss (Campbell, 1968). Limestone and dolomite occurrences of limited extent are also present in the Grand Forks gneiss, between Christina Lake to the east and the Granby River to the west (Preto, 1971). A number of limestone beds were mapped east and northeast of Vernon in the Monashee gneiss (Jones, 1959). Most of these have been later identified as calcareous quartzites. (McCammon, 1961, pp. 144, 147).

Carbonates contained in these metamorphic complexes are usually coarse-grained, recrystallized and sometimes extensively contaminated with metamorphic silicates. Inclusions of schist and gneiss are common.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1961): Limestone in the Vernon Area; Minister of Mines Report, page 144.

Meyers, R.H., Taylor, W.A. and Tempelman-Kluit, D. (1989): Lode Gold-Silver Occurrences of the Okanagan Region; Open File 1989-5.

Geological Survey of Canada:

Campbell, R.B. (1968): Canoe River, British Columbia; Map 15-1967.

Jones, A.G. (1959): Vernon Map-area, British Columbia; Memoir 296, pages 10-11, 15-16 and accompanying Map 1059A [Vernon, British Columbia; Rice, H.M.A. and Jones, A.G. (1960)].

Little, H.W. (1957): Kettle River (East Half), Similkameen, Kootenay and Osoyoos Districts, British Columbia, Map 6-1957.

Preto, V.A. (1971): Structure and Petrology of the Grand Forks Group, British Columbia; Paper 69-22.

Tempelman-Kluit, D.J. (1989a): Geology of Penticton, British Columbia; Map 1736A.

Tempelman-Kluit, D.J. (1989b): Geological Map with Mineral Occurrences, Fossil Locations, Radiometric Ages and Gravity Field for Penticton Map Area (NTS 82E), Southern British Columbia; Open File 1969.

Blue River Calcite NTS: 83D/03W
MINFILE No.: 83D 044 Latitude: 52°07'40"
Map No.: L192 Longitude: 119°18'40"

The Blue River deposit outcrops on a low hill northwest of the community of Blue River, a kilometre northwest of the Yellowhead South Highway (Highway 5). The limestone (marble) is exposed in three major outcrops over the top of the hill, the largest being 180 by 120 metres in area (Main Zone), 230 metres above the floor of the North Thompson valley. The limestone is surrounded by gneiss and pegmatite of the Monashee gneiss. Contacts with the enclosing gneiss strike 075° to 123° and dip 45° to 60° south. Diamond drilling indicates the limestone in the Main Zone is at least 44 metres thick.

TABLE 33
ANALYSES OF LIMESTONES IN MONASHEE AND GRAND FORKS GNEISSES

Deposit	Map No.	ID	CaO %	MgO %	SiO_2 %	Al_2O_3 %	Insol. %	R_2O_3 %	Fe_2O_3 %	MnO %	P_2O_5 %	S %	LOI %	H_2O %
							Na_2O^*	K_2O^*				TiO_2^*		
Blue River	L192	1	53.6	1.02	0.71	0.13	0.026	0.020			0.20			
		2	53.60	1.78	0.23	0.23	0.026	0.03	0.09	0.01	0.04	0.01	41.6	
Grand Forks	D011	3	30.86	20.69			1.19	0.98	0.49	0.039	0.03	0.004	46.20	0.09
Highway 6	L193	4	43.41	0.51			19.88	1.14	0.83	0.04	0.04	trace	34.82	0.11

Notes

1. Average of eight grab samples from surface on the Main Zone (Master, 1986, Table 2-1).
2. Average of 35.7 m limestone intersection in drill core (Guillet, 1984).
3. Composite of random chips from quarry east of Morrissey Creek (McCammon, 1971, p. 491).
4. Composite of random chips across outcrop (McCammon, 1961, p. 148, Sample 7).

**Refers only to values immediately following.*

The Main Zone is comprised mostly of coarse-grained, white, massive marble, with some pale grey patches and a few medium-grained, medium grey to blue-grey beds. Only traces of disseminated biotite, white mica and pyrite are evident. Tremolite occurs in some fracture infillings. Diamond-drill holes intersected several medium-grained, light to medium grey, dolomitic and siliceous beds up to 3.0 metres thick. These beds tend to be more micaceous and pyritic than the enclosing limestone. Some bands of pegmatitic quartz-feldspar gneiss and biotite gneiss up to 4.6 metres thick were also intersected near surface. Analytical results from surface and drill-hole sampling are given in Table 33. Core samples had an average brightness of 94.4 per cent. The Main Zone is estimated to contain 1.8 million tonnes of limestone based on diamond drilling (Guillet, 1984).

This deposit has been explored for its calcite marble since 1983. Techmin Canada Ltd. (formerly Blue River Mines Ltd.) and Ekaton Industries Inc., both of Calgary, Alberta, have carried out an extensive program of mapping, diamond drilling and bulk sampling since 1984. Blue River Mines mined and crushed 7800 tonnes of limestone in 1988. The property has been inactive since then, largely due to the inability to secure long-term large-tonnage sales contracts. The company has so far (to 1989) only received inquiries for limestone for decorative purposes.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Guillet, G.R. (1984a): Diamond Drilling Report on the Sno Property; Assessment Report 12789.

Guillet, G.R. (1984b): Blue River Calcite; unpublished report in Industrial Mineral File.

Master, P.P. (1986): Final Technical Report on the Blue River Marble Deposit; Assessment Report 15725.

Grand Forks NTS: 82E/01W
MINFILE No.: 82ESE036 Latitude: 49°01'55"
Map No.: D011 Longitude: 118°22'52"

This occurrence is located 250 metres north of Highway 3, east of Morrissey Creek, approximately 4 kilometres east of Grand Forks.

High-grade metamorphic rocks of the Grand Forks gneiss complex include a bed of biotite schist (mica gneiss) 30 to 60 metres thick containing several lenses of dolomite, 10 to 30 metres thick, that extend eastward from Morrissey Creek along the base of a bluff for some 500 metres. These rocks are intruded by bodies of pegmatitic gneiss and andesitic to dacitic dikes. Bedding in a quarry east of Morrissey Creek strikes 110° and dips 75° south. Across the creek to the west a band of dolomitic limestone 30 metres thick and overlying biotite-hornblende migmatite strike north and dip 30° west. The two sequences on either side of Morrissey Creek are probably separated by a fault.

The deposit is comprised of medium to coarse-grained (2-6 mm), brownish weathering, white dolomite, containing scattered streaks and spots of light green to yellowish green serpentine, flakes of yellow to light brown phlogopite and vein-like bodies of feldspar. Various other minor constituents include calcite, forsterite, diopside, spinel, anthophyllite, tremolite, biotite and apatite. An analysis reported by McCammon (1971) is in Table 33. Dolomite reserves are estimated at 1 million tonnes (Gunter, 1984, p. 14).

The dolomitic limestone west of Morrissey Creek is medium grained and white in colour. Chert beds are prominent within this unit. The limestone contains minor diopside, mica and serpentine.

Dolomite and limestone were initially quarried here for building stone and lime as early as 1916. Ramshead Quarries Ltd. quarried the dolomite for building stone from 1968 to 1971. V.T.S. Quarry Ltd. performed some minor exploration work in 1984. This was followed shortly

afterwards by an unsuccessful attempt to produce crushed and ground dolomite products.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Gunter, R. (1984): Geological Report on the Beaver Property; Assessment Report 13176.

Hora, Z.D. (1986): New Developments in Industrial Minerals; in Geological Fieldwork 1985, Paper 1986-1, page 240.

McCammon, J.W. (1960): Limestone in the Greenwood - Grand Forks Area; Minister of Mines Report, pages 142-143.

McCammon, J.W. (1971): Ramshead Quarries; in Geology, Exploration and Mining in British Columbia 1970, pages 490-491.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, page 190.

Parks, W.A. (1917): Report on the Building and Ornamental Stones of Canada; Report 452, Volume 5, pages 140-141.

Walled Claims (Mabel Lake) NTS: 82L/10E
MINFILE No.: 82LNE041 Latitude: 50°36'37"
Map No.: D012 Longitude: 118°38'05"

Dolomite and limestone outcrop on the south side of Tsuius Creek, 3 kilometres east of Mabel Lake within granitic gneiss of the Monashee gneiss complex. Three short holes drilled on dolomite outcrop along a section trending north-northwest over a distance of 580 metres intersected continuous dolomite to depths of up to 20.7 metres.

Drilling intersected light grey to white, medium-grained dolomite with some calcite stringers, minor pyrite and minor garnet, occurring sometimes as thin, reddish brown bands. A few bands of very light grey, recrystallized limestone (marble) in dolomite were also intersected. This dolomitic sequence is underlain by white to very light grey limestone with occasional garnet and minor pyrite.

The deposit was explored in 1979 by Wallace Chaput to evaluate the dolomite for use as dimension stone. Three holes were drilled for a total of 40.8 metres.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Singhai, G. (1979): Diamond Drilling Report on the Walled Property; Assessment Report 7797.

Highway 6 (Vernon) NTS: 82L/03E
MINFILE No.: 82LSW084 Latitude: 50°14'37"
Map No.: L193 Longitude: 119°14'23"

A mass of limestone in the Monashee gneiss outcrops over an area 150 metres in diameter on the north slope of a hill, 400 metres south of Highway 6, 3.2 kilometres south-southeast of Vernon.

The limestone is dark grey, well fractured, very siliceous and cut by numerous white calcite veinlets. An analysis reported by McCammon (1961) is in Table 33.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

McCammon, J.W. (1961): Limestone in the Vernon Area; Minister of Mines Report, pages 147-148.

FORELAND BELT

JUBILEE FORMATION

The Jubilee Formation is a cliff-forming dolomite unit of Middle to Upper Cambrian age overlain by limestone and shale of the Upper Cambrian to Ordovician McKay Group. The formation has been previously mapped in part as the Ottertail Formation (Walker, 1926). The Ottertail Formation is now defined as the stratigraphically equivalent massive limestone unit, with minor dolomite and shale, outcropping farther east in the Vermillion Range. Folding and faulting causes the Jubilee Formation to outcrop in narrow, northwest-trending bands in the vicinity of the Rocky Mountain Trench, between latitudes 49°45′ north and 51° north. Most of the unit lies east of the trench, however, northwest of Invermere the formation outcrops along the west side of the trench on Mount Forster, north of Horsethief Creek, and on Steamboat and Jubilee mountains. The unit varies in thickness from 1200 metres in the Hughes Range to 120 metres in the vicinity of Horsethief Creek.

The Jubilee Formation can be divided into two distinct members. The lower member consists of well-bedded and laminated, fine-grained, white to dark grey dolomite that weathers to a cream to dark blue- grey colour. A few of the beds are mottled. White to black chert occurs in minor amounts in most beds as lenses and laminae paralleling bedding and as lace-like stringers. Chert contamination is extensive in some beds. This member varies up to 700 metres thick in the Hughes Range. In the Stanford Range it is approximately 300 metres thick.

The upper member contains thickly bedded to massive, fine to coarse-grained, white to dark grey, mostly light grey dolomite, which weathers mainly to a light grey and less commonly to a buff or light pinkish colour. Chert is locally abundant in the form of irregular masses and thin lenses. The upper member is 500 metres thick in the Hughes Range and between 150 and 300 metres thick east of Fairmont Hot Springs.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Bennett, S. (1986): Geology of the Mount Fraser Map-area (82K/9,16); Preliminary Map 62.

Henderson, G.G.L. (1954): Geology of the Stanford Range of the Rocky Mountains, East Kootenay District, British Columbia; Bulletin 35, pages 19-20.

Geological Survey of Canada:

Leech, G.B. (1954): Canal Flats, British Columbia; Paper 54-7, pages 9-10.

Leech, G.B. (1959): Canal Flats, Kootenay District, British Columbia; Map 24-1958.

Leech, G.B. (1960): Fernie (West Half), British Columbia; Map 11-1960.

Leech, G.B. (1979): Geology, Kananaskis Lakes, West Half, British Columbia and Alberta (82J W1/2); Open File 634.

Reesor, J.E. (1973): Geology of the Lardeau Map-area; Memoir 369, pages 47-48 and accompanying Map 1326A.

Walker, J.F. (1926): Geology and Mineral Deposits of Windermere Map-area, British Columbia; Memoir 148, pages 21-22.

Pond Claims (Canal Flats) NTS: 82J/04W
MINFILE No.: 82JSW033 Latitude: 50°03′11″
Map No.: D013 Longitude: 115°45′55″

Dolomite of the lower member of the Jubilee Formation forms a ridge trending north-northwest for 6.3 kilometres along the east side of the Kootenay River, 8.8 to 15.1 kilometres south-southeast of Canal Flats. The dolomite outcrops over widths of up to 750 metres near the centre of the ridge. Bedding strikes 165° to 195° and dips 35° to 50° east.

Six diamond-drill holes near the south end of the ridge, a short distance west of Island Pond, intersected light to dark grey to bluish grey, variably mottled, fine to medium-grained dolomite, displaying minor brecciation accompanied by secondary white to pinkish dolomite filling fractures. Tabular to wavy to lenticular laminae are quite common. In places, the rock becomes more massive with indistinct bedding. Some black to light grey chert lenses and a few irregular blotches and rounded blebs of dark bluish grey chert are present. Vugs encrusted with white dolomite or pink calcite are present locally.

Two diamond-drill holes near the centre of the ridge, some 3 kilometres to the north, cored light to medium grey to blue grey, fine-grained, massive to well-laminated dolomite extensively brecciated and cemented with white dolomite and white to pinkish calcite.

Analyses of drill-core samples are given in Table 34.

Cominco Ltd. staked the southern half of the deposit in 1980 in order to evaluate it as a potential source of magnesium metal. Six holes were drilled in 1981 on the

TABLE 34
ANALYSES OF JUBILEE AND BEAVERFOOT DOLOMITES

Deposit	Map No.	ID	CaO %	MgO %	SiO_2 %	Al_2O_3 %	Insol. %	R_2O_3 %	Fe_2O_3 %	MnO %	P_2O_5 %	S %	LOI %	H_2O %
							Na_2O*	K_2O*				SO_4*		
Pond Claims	D013	1	31.06	21.29	0.95	0.26	0.028	0.080	0.24		0.006	0.011	45.66	
		2	30.09	21.53	2.30	0.23	0.022	0.044	0.12		0.011	0.025	45.37	
Fairmont Mtn.	D014	3	31.14	21.11	0.18	0.20			0.26			trace		
		4	30.98	21.40	0.06	0.14			0.29			trace		
Athalmer	D015	5	30.59	20.54	1.88	0.68			0.28			trace		
Spillimacheen	D016	6	30.91	21.54	0.74	0.25			0.50			0.02		
Geary Creek	D017	7	30.39	21.26	1.40	0.40			0.30			trace		
Glenogle	D018	8	31.20	21.02	1.28	0.41			0.28			0.01		
		9	31.09	20.71	1.10	0.29			0.46			0.01		
Fairmont Creek	D019	10	31.20	20.75	0.70	0.20			0.43			trace		

Notes

1. *Average of composite samples from diamond-drill holes P-81-1 to 5 on the North zone (Hamilton, 1981).*
2. *Average of composite samples from diamond-drill holes P-81-6 and 7 on the South zone (Hamilton, 1981).*
3. *Sample from west end of ridge (Goudge, 1944, p. 214, Sample 91).*
4. *Sample from near the top of the ridge (Goudge, 1944, p. 214, Sample 91B).*
5. *Sample of unspecified character (Goudge, 1944, p. 214, Sample 90).*
6. *White-weathering dolomite from the base of the mountain (Goudge, 1944, p. 214, Sample 87).*
7. *Composite of random chips taken over the spur (Goudge, 1944, p. 214, Sample 93).*
8. *Very fine grained, white dolomite (Goudge, 1944, p. 191, Sample 53).*
9. *Fainly mottled, light grey dolomite (Goudge, 1944, p. 191, Sample 53B).*
10. *Composite of chips collected at random from a saddle north of Fairmont Mountain and along the slope facing Fairmont Creek (Goudge, 1944, p. 214, Sample 92).*

**Refers only to next two values following.*

Pond 1 claim near the south end of the deposit for a total of 636 metres. An additional 140 metres were drilled in two holes on the Pond 3 claim farther north, in the middle of the deposit.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Hamilton, J.M. (1980): Diamond Drilling Report on the Pond Property; Assessment Report 8975.

Hamilton, J.M. (1981): Diamond Drilling Report on the Pond Property; Assessment Report 10079.

Fairmont Mountain
(Fairmont Hot Springs)

NTS: 82J/05W
MINFILE No.: 82JSW023 Latitude: 50°19'28"
Map No.: D014 Longitude: 115°49'58"

Dolomite underlies a ridge that rises southeastward from Fairmont Hot Springs, culminating in the summit of Fairmont Mountain, and continuing eastward to the Kootenay River for a total length of 10 kilometres. Bedding strikes 090° to 135° and dips 25° to 65° north. The formation is estimated to be 600 metres thick along the ridge.

In the vicinity of Fairmont Hot Springs the upper member of the Jubilee Formation is dark bluish grey and fine grained. Near the top of the ridge, farther east, the dolomite becomes pale bluish grey to pinkish grey and medium-grained. Both rock types weather to a rough, dark brownish grey surface. Analyses reported by Goudge (1944) are in Table 34.

The underlying lower member is comprised of light to dark grey, well-bedded dolomite frequently displaying fine laminae, as exposed in a section 288 metres thick on the south slope of Mount Fairmont. Some of the beds contain numerous chert nodules.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Henderson, G.G.L. (1954): Geology of the Stanford Range of the Rocky Mountains, East Kootenay District, British Columbia; Bulletin 35, pages 66-67.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 214-215.

Athalmer (Dry Gulch)

NTS: 82K/09E
MINFILE No.: 82KNE078 Latitude: 50°35'23"
Map No.: D015 Longitude: 116°00'13"

Dolomite is exposed in a vertical cliff in the headwaters of Dry Gulch Creek, 2.6 kilometres east of Highway 95 and 8.2 kilometres north-northeast of Athalmer. The dolomite continues northwestward for 2 kilometres as a narrow, fault-bounded mass within limestone and shale of the Cambrian-Ordovician McKay Group.

At Dry Gulch Creek the dolomite is fine-grained and grey in colour. It is reported to be of good grade despite a few white and blue chert nodules. An analysis reported by Goudge (1944) is in Table 34.

Selected Bibliography

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 213-214.

BEAVERFOOT FORMATION

The Beaverfoot Formation is a massive, cliff-forming unit of Upper Ordovician age, resting on either quartzite of the Ordovician Mount Wilson (Wonah) Formation or limestone and shale of the Cambrian to Ordovician McKay Group. Folding and faulting has broken up the formation into a series of parallel, northwest-trending bands lying just east of the Rocky Mountain Trench between latitudes 49°45′ and 51°30′ north in southeastern British Columbia and between 54°05′ and 55°00′ north in the northeastern part of the province. The unit varies in thickness from at least 600 metres in the Stanford Ranges to less than 7 metres south of Horsethief Creek.

The formation is generally comprised of massive to thickly bedded, dark to light grey to brownish grey, pinkish to light grey to nearly white weathering, fine-grained dolomite. The unit becomes well-bedded to the north in the vicinity of Bush River (82NW). Some beds contain interbedded dolomite and limestone. Lenses and nodules of chert are occasionally present in some of the beds and sandstone beds occur sporadically throughout the formation. In places the formation contains a basal member consisting of dark grey argillaceous dolomite and sandstone ("Whisky Trail member").

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Henderson, G.G.L. (1954): Geology of the Stanford Range of the Rocky Mountains, East Kootenay District, British Columbia; Bulletin 35, pages 25, 68-70.

Geological Survey of Canada:

Balkwill, H.R., Price, R.A. and Mountjoy, E.W. (1980): Golden (West Half), B.C.; Map 1497A.

Leech, G.B. (1954): Canal Flats, British Columbia; Paper 54-7, pages 19-20.

Leech, G.B. (1960): Fernie (West Half), British Columbia; Map 11-1960.

Leech, G.B. (1979): Geology, Kananaskis Lakes, West Half, British Columbia and Alberta (82J W1/2); Open File 634.

Reesor, J.E. (1973): Geology of the Lardeau Map-area; Memoir 369, pages 51-53 and accompanying Map 1326A.

Stott, D.F. (1972): Geological Maps of Northeastern B.C. and Northwestern Alberta; Open File 286.

Taylor, G.C. and Stott, D.F. (1979): Monkman Pass Map-area, British Columbia (93I); Open File 630.

Wheeler, J.O. (1961): Rogers Pass - Golden (West Half), British Columbia and Alberta; Map 4-1961.

Spillimacheen NTS: 82K/16W
MINFILE No.: 82KNE077 Latitude: 50°56′08″
Map No.: D016 Longitude: 116°22′32″

Dolomite outcrops south of Cedared Creek, 3.2 kilometres northwest of Spillimacheen and continues southeastward along the mountainside for 8.75 kilometres on the west limb of the Kindersley Creek anticline. The strata generally strike 140° and dip 75° southwest.

The deposit is comprised of nearly white weathering, brownish grey, thickly bedded, fine-grained dolomite, with some beds of brown-weathering brecciated dolomite cemented in part by white calcite. An analysis reported by Goudge (1944) is in Table 34.

Selected Bibliography

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 213-214.

Geary Creek
(Fairmont Hot Springs) NTS: 82J/05W
MINFILE No.: 82JSW032 Latitude: 50°18′24″
Map No.: D017 Longitude: 115°49′44″

Dolomite underlies a spur that rises southeastward along the south side of Geary Creek, northeast of the north end of Columbia Lake. It is exposed along the crest of the spur over a length of 3.8 kilometres and a width of up to 1200 metres. Bedding strikes 105° to 120° and dips 30° to 45° north.

The deposit is comprised of very fine-grained, dark bluish grey, thickly bedded dolomite. An analysis reported by Goudge (1944) is in Table 34.

Selected Bibliography

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 214-215.

Glenogle
(Kicking Horse River) NTS: 82N/07W
MINFILE No.: 82N 076 Latitude: 51°17'23"
Map No.: D018 Longitude: 116°50'20"

A northwest-trending belt of dolomite is well exposed along the TransCanada Highway (Highway 1), 1.5 to 3 kilometres west of Glenogle Station, in the canyon of the Kicking Horse River. It is massive to thin bedded, light to dark grey and fine-grained. Chert is quite abundant in places. Analyses reported by Goudge (1944) are in Table 34.

A quarry was operated by the Canadian Pacific Railway 1.6 kilometres west of Glenogle Station to supply dolomite for use as railroad ballast sometime during the early 1940s.

Selected Bibliography

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 188, 191.

Fairmont Creek NTS: 82J/05W
MINFILE No.: 82JSW031 Latitude: 50°18'45"
Map No.: D019 Longitude: 115°46'45"

Dolomite is exposed over widths of up to 900 metres south of Fairmont Creek, along the north flank of a ridge extending for 7.5 kilometres eastward from Fairmont Hot Springs to the Kootenay River.

Bedding strikes 95° to 110° and dips 45° to 55° north. The dolomite is fine grained, pale blue and faintly mottled with light grey. An analysis reported by Goudge (1944) is in Table 34.

Selected Bibliography

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 214-215.

NONDA FORMATION

The Nonda Formation is a dolomite unit of Lower Silurian age extending from 53°45' north latitude northwestward along the east side of the Rocky Mountain Trench into the Yukon Territory. The formation appears to contain a limestone member of extreme purity in the vicinity of Toad River near the Alaska Highway.

Selected Bibliography

Geological Survey of Canada:

Taylor, G.C. (1963): Geology, McDonald Creek, British Columbia; Map 28-1963.

Taylor, G.C. and Stott, D.F. (1971): Tuchodi Lakes, British Columbia; Open File 79.

Taylor, G.C. and Stott, D.F. (1973): Tuchodi Lakes Map-area, British Columbia; Memoir 373, pages 17-18 and accompanying Map 1343A.

Penny Claims (Toad River) NTS: 94K/12E
MINFILE No.: 94K 087 Latitude: 58°43'26"
Map No.: L194 Longitude: 125°40'56"

This deposit is situated on a west-flowing tributary of the Toad River, 2 kilometres east of the river, 180 kilometres west of Fort Nelson. It comprises an outcrop of extremely pure, porcelaneous (cryptocrystalline), milky white, massive limestone 60 metres wide and 30 metres high. An analysis by Cominco Ltd. is given in Table 35. The deposit was staked and sampled by Robert Keays of Fort Nelson in 1989.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Keays, R. (1989): letter and Cominco Ltd. assay certificate in Industrial Mineral File.

PALLISER FORMATION

The Upper Devonian Palliser Formation is exposed throughout most of the Canadian Rocky Mountains. In British Columbia it outcrops between latitudes 49° and 51° north and between latitudes 53°50' and 54°45' north. In southeastern British Columbia the formation is confined to two main belts lying on either side of the Elk River. The western belt extends 170 kilometres northward from Fernie to the Alberta border, while the eastern belt trends northward from the Flathead River, following the Alberta border for 140 kilometres before crossing completely over into Alberta. In northeastern British Columbia the unit trends 120 kilometres northwestward from the Alberta border to a point 13 kilometres southwest of Quintette Mountain. Extensive folding and thrust faulting, so characteristic of the Foreland Belt, has broken up the Palliser Formation into a series of discontinuous belts trending north to northwest. The formation is underlain by various Upper Devonian units such as the Alexo Formation (limestone and dolomite), Fairholme Group (carbonates, siltstone, quartzite) and the Besa River Formation (calcareous

shale) and overlain by black shale of the Mississippian Exshaw Formation.

In the Kootenays the Palliser Formation comprises a lower member (Morro member) of massive, cliff-forming, light to dark grey, fine-grained mottled limestone and nodular limestone with some interbedded grey and brownish grey, medium-grained dolomite, overlain by an upper member (Costigan member) of less resistant, thin to medium-bedded, dark grey, very fine-grained, nodular argillaceous limestone. In the Flathead map area (82G/07E) the Morro and Costigan members are 150 metres and 50 metres thick respectively.

In the McBride map area of northeastern British Columbia (93H) the Palliser Formation comprises 240 to 300 metres of massive to thickly bedded, dark grey, resistant, micritic limestone.

The Palliser Formation has the potential to contain considerable widths of high-calcium limestone with minor to extensive contamination by zones of mottled to bedded dolomite. A combined analysis of seven samples representing a 216-metre stratigraphic section of Palliser Formation exposed on the Alberta side of Crowsnest Pass north of Crowsnest Lake, is given in Table 35. The unit is currently quarried for cement manufacturing in Alberta by Lafarge Canada Inc. at Exshaw and by Inland Cement Ltd. at Cadomin.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Banister, W.E. (1957): Geological Report on the Stratigraphy and Structure, Fernie and Flathead Map Areas; Petroleum Assessment Report 617.

Höy, T. and Carter, G. (1988): Geology of the Fernie West Half Map Sheet (and part of Nelson E 1/2) (82G/W 1/2, 82F/E 1/2); Open File 1988-14.

Oswald, D.H. (1963): Surface Geology of Howell Creek Area; Petroleum Assessment Report 1089-1.

Geological Survey of Canada:

Campbell, R.B., Mountjoy, E.W. and Young, F.G. (1973): Geology of the McBride Map-area, British Columbia; Paper 72-35, page 27 and accompanying Map 1356A.

Leech, G.B. (1960): Fernie (West Half), British Columbia; Map 11-1960.

Leech, G.B. (1979): Geology, Kananaskis Lakes, West Half, British Columbia and Alberta (82J W1/2); Open File 634.

Norris, D.K. (1958): Beehive Mountain, Alberta and British Columbia; Paper 58-5, page 5 and accompanying Map 14-1958.

Price, R.A. (1965): Flathead Map-area, British Columbia and Alberta; Memoir 336, pages 38-40 and accompanying Map 1154A.

Taylor, G.C. and Stott, D.F. (1979): Monkman Pass Map-area, British Columbia (93I); Open File 630.

Alberta Research Council:

Holter, M.E. (1976): Limestone Resources of Alberta; Economic Geology Report 4, pages 8-13, 17-20, 23-29.

Wardner South NTS: 82G/06W
MINFILE No.: 82GSW063 Latitude: 49°24'36"
Map No.: L195 Longitude: 115°25'17"

Limestone is exposed along a railway-cut just south of Wardner on the west side of the Kootenay River. The limestone strikes 065° and dips 30° north. The railway-cut exposes thin-bedded to massive, well-fractured, fine-grained, dark bluish grey high-calcium limestone with some bands and fine mottlings of brown-weathering mag-

TABLE 35
ANALYSES OF NONDA AND PALLISER LIMESTONES

Deposit	Map No.	ID	CaO %	MgO %	SiO_2 %	Al_2O_3 %	Insol. %	R_2O_3 %	Fe_2O_3 %	MnO %	P_2O_5 %	S %	LOI %	H_2O %
							Na_2O^*	K_2O^*				TiO_2^*		
Penny Claims	L194	1	56.05	0.35	0.11	0.01	0.02	0.01	0.01	0.01	0.01	0.01	43.74	
Crowsnest Pass		2	53.66	2.39	0.98	0.29			0.14					
Wardner South	L195	3	47.25	6.32	2.04	0.40			0.16			trace		

Notes

1. Sample of limestone assayed by Cominco Ltd. (Keays, 1989).
2. Representative sample of 216 m section of Palliser Formation exposed on the north side of Crowsnest Lake in Alberta (Holter, 1976, Table A-1, Analysis 3).
3. Mottled limestone from near the railway bridge crossing the Kootenay River (Goudge, 1944, p. 202, Sample 74).

**Refers only to values immediately following.*

nesian material. The upper part of the exposed section contains thin shale partings. An analysis reported by Goudge (1944) is in Table 35.

Selected Bibliography

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 201-202.

RUNDLE GROUP

Carbonates of the Mississippian Rundle Group outcrop discontinuously over most of the Canadian Rocky Mountains. As with other units in the Foreland Belt, the Rundle Group has been affected by extensive folding and thrust faulting. The group is confined to narrow, northwesterly trending belts kilometres to tens of kilometres in length.

In southeastern British Columbia the Rundle Group is largely confined to two north-trending belts, similar to the Palliser Formation, with the western belt extending northward from Fernie along the west side of the Elk River for 120 kilometres and the eastern belt following the Alberta border for 140 kilometres before crossing into Alberta southeast of Upper Kananaskis Lake. The group is underlain by argillaceous limestone and shale of the Mississippian Banff Formation and overlain by sandstone and dolomite of the Permian and Pennsylvanian Rocky Mountain Formation in the southern Canadian Rockies. In this region it has been divided into three formations, from bottom to top: Livingstone, Mount Head and Etherington formations.

The Livingstone Formation is characterized by light grey, coarse-grained, thickly bedded to massive, variably cherty, cliff-forming limestone, with lesser amounts of interbedded, medium to light grey, fine-grained limestone and silty limestone. Beds of light grey, fine-grained dolomite occur in the upper half of the unit, while the chert tends to be confined to the lower half. Thicknesses vary from 335 to 420 metres.

The Mount Head Formation contains mostly medium to thin-bedded, medium to fine-grained, light grey to black, occasionally argillaceous to sandy dolomite and limestone with nodules and beds of black chert dispersed throughout. One prominent cliff-forming member (Loomis member) outcrops near the base of the formation. It consists of massive, light to medium grey, medium to very coarse-grained limestone with some interbedded, medium to fine-grained, light brownish grey dolomite. This member is from 90 to 140 metres thick. The formation generally ranges from 180 to 330 metres in thickness.

The Etherington Formation comprises a lower member containing thinly interbedded, medium to coarse-grained, light grey limestone and platy, fine-grained, light grey and yellowish grey, commonly silty limestone and dolomite with minor shale, overlain by a thinner upper member comprised of light grey to black, fine-grained, silty limestone and dolomite, with stringers and blebs of grey chert. The formation ranges from 58 to 235 metres in thickness

In northeastern British Columbia the Rundle Group outcrops between latitudes 53°50′ and 55°25′ north, extending northwestward from the Alberta border to southeast of Pine Pass. The group is underlain by shaly carbonates of the Mississippian Banff Formation or shales of the Mississippian-Devonian Besa River Formation and overlain by calcareous siltstone and sandstone of the Permo-Carboniferous Stoddart Group or by siltstone, shale and minor carbonate of the Triassic Sulphur Mountain Formation. Near the Alberta border the Rundle Group has been divided into three formations, from bottom to top: Pekisko, Shunda and Turner Valley formations. Farther north the group remains undivided and is sometimes referred to as the Rundle Formation.

The group is the main cliff-forming unit of the Front Range (Hart Ranges) in the northern Rocky Mountains. It comprises 300 to 450 metres of limestone and dolomite with locally abundant chert nodules and interbedded siltstone. The Prophet Formation is a stratigraphically equivalent unit of mostly massive, light grey, cherty limestone and dolomite, with minor shale and siltstone that continues northwest of the Rundle Group. Between Intersection Mountain and the Narraway River (93HNE, 93ISE) the group comprises 30 to 46 metres of resistant, massive limestone of the basal Pekisko Formation, overlain by 90 metres of thin-bedded, micritic limestone and fine-grained dolomite of the Shunda Formation, in turn overlain by up to 180 metres of fine to coarse-grained, thin to medium-bedded, generally cherty dolomite of the Turner Valley Formation. In the Hook Lake area (93INW) the group contains a similar unnamed succession consisting of 30 to 60 metres of light grey weathering, medium to very coarse-grained, locally dolomitized, resistant, detrital limestone overlain by 120 to 150 metres of brownish grey weathering, argillaceous limestone and fine to medium-grained dolomite, followed by 170 to 200 metres of light grey and brown-weathering, fine to coarse-grained, resistant dolomite.

In general, the limestones of the Rundle Group become more argillaceous and dolomitic up section. Purer limestones exhibiting minor to moderate contamination by chert and dolomite seem to be confined to the base of the group. Massive resistant beds of extreme purity can be found in both northeastern and southeastern British Columbia. Such beds are currently being exploited in Alberta for lime manufacturing by Summit Lime Works Ltd. in the Crowsnest Pass and by Continental Lime Ltd. at Exshaw. Summit Lime operates a series of quarries on the north side Crowsnest Pass in the Livingstone Formation and the basal portion of the Mount Head Formation,

1 to 3 kilometres southeast of the provincial boundary. The quarries lie in the eastern part of the belt that continues northward along the British Columbia - Alberta border for 140 kilometres. Continental Lime is quarrying ultrahigh-calcium limestone of the Livingstone Formation grading 99 per cent $CaCO_3$ and less than 1 per cent SiO_2 (Holter, 1976, p. 20). The average analysis of a series of samples taken on the north side of Crowsnest Pass along a 60-metre horizontal section of westward dipping strata of the Livingstone Formation is given in Table 36.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Banister, W.E. (1957): Geological Report on the Stratigraphy and Structure, Fernie and Flathead Map Areas; Petroleum Assessment Report 617.

Höy, T. and Carter, G. (1988): Geology of the Fernie West Half Map Sheet (and part of Nelson E 1/2) (82G/W 1/2, 82F/E 1/2); Open File 1988-14.

Oswald, D.H. (1963): Surface Geology of Howell Creek Area; Petroleum Assessment Report 1089-1.

Geological Survey of Canada:

Bamber, E.W. and Macqueen, R.W. (1971): Lower Carboniferous and Permian Stratigraphy, Monkman Pass Area, Northeastern, British Columbia; *in* Report of Activities, Paper 71-1A, pages 193-196.

Campbell, R.B., Mountjoy, E.W. and Young, F.G. (1973): Geology of the McBride Map-area, British Columbia; Paper 72-35, page 28 and accompanying Map 1356A.

Leech, G.B. (1960): Fernie (West Half), British Columbia; Map 11-1960.

Leech, G.B. (1979): Geology, Kananaskis Lakes, West Half, British Columbia and Alberta (82J W1/2); Open File 634.

Muller, J.E. (1961): Pine Pass, British Columbia; Map 11-1961.

Norris, D.K. (1958): Beehive Mountain, Alberta and British Columbia; Paper 58-5, page 6-8. and accompanying Map 14-1958.

Price, R.A. (1965): Flathead Map-area, British Columbia and Alberta; Memoir 336, pages 43-52 and accompanying Map 1154A.

Stott, D.F. (1972): Geological Maps of Northeastern B.C. and Northwestern Alberta; Open File 286.

TABLE 36
ANALYSES OF RUNDLE GROUP LIMESTONES

Deposit	Map No.	ID	CaO %	MgO %	SiO_2 %	Al_2O_3 %	Insol. %	R_2O_3 %	Fe_2O_3 %	MnO %	P_2O_5 %	S %	LOI %	H_2O %
Crowsnest Pass		1	55.03	1.37	0.21	0.09			0.05					
Wardner North	L196	2	55.24	0.29	0.38	0.12			0.06			nil		
		3	54.37	0.44	1.50	0.37			0.07			nil		
Kootenay R. East	L197	4	54.41	0.53	0.94	0.23			0.33			0.02		
		5	30.37	18.03	7.48	0.55			0.55			trace		
Kootenay R. West	L198	6	52.46	2.77	0.14	0.09			0.07			trace		
Bull River	D020	7	46.87	7.66	0.54	0.20			0.16			trace		
		8	38.65	13.71	1.92	0.24			0.26			trace		
		9	54.98	0.48	0.48	0.02			0.18			trace		
		10	47.11	7.07	1.28	0.02			0.18			trace		
							Na_2O*	K_2O*		Mn*	PO_4*		Ti*	TiO_2*
Baker Creek	L199	11	52.8	0.29		0.10	<0.01	0.02	0.06	<4 ppm	74 ppm		144 ppm	
		12	55.7	0.58	0.98	0.30			<0.07	0.004			43.36	0.02

Notes

1. Average of a series of samples along a 60 m horizontal section of west-dipping Livingstone limestone exposed on the north side of Crowsnest Pass in Alberta (Holter, 1976, Table A-1, Analysis 12).
2. Grab sample of coarse-grained limestone midway up the hill (Goudge, 1944, p. 202, Sample 73A).
3. Grab sample of fine-grained limestone (Goudge, 1944, p. 202, Sample 73B).
4. Purer limestone along the face of a 60 m hill near the railway (Goudge, 1944, p. 202, Sample 71).
5. Yellowish brown magnesian limestone 800 m north of the kilns (Goudge, 1944, p. 202, Sample 72).
6. Grab sample of limestone (Goudge, 1944, p. 202, Sample 69).
7. Sample across Bed 1 (Goudge, 1944, p. 202, Sample 70).
8. Sample across Bed 2 (Goudge, 1944, p. 202, Sample 70A).
9. Sample across Bed 3 (Goudge, 1944, p. 202, Sample 70B).
10. Sample across Bed 4 (Goudge, 1944, p. 202, Sample 70C).
11. Average of four 5 m chip samples taken in succession across 20 m of limestone (Curry, 1983).
12. Sample of crushed and screened limestone from stockpile (Hora, 1986).

**Refers only to values immediately following.*

Stott, D.F. McMechan, M.E., Taylor, G.C. and Muller, J.E. (1983): Pine Pass (93O) Map Area, B.C.; Open File 925.

Taylor, G.C. and Stott, D.F. (1979): Monkman Pass Map-area, British Columbia (93I); Open File 630.

Thompson, R.I. (1987): Geology of Halfway River, British Columbia; Map 1634A.

Thompson, R.I. (1989): Stratigraphy, Tectonic Evolution and Structural Analysis of the Half Way River Map Area (94B), Northern Rocky Mountains, British Columbia; Memoir 425, page 33.

Alberta Research Council:

Holter, M.E. (1976): Limestone Resources of Alberta; Economic Geology Report 4, pages 8-29.

Southern Foreland Belt

Wardner North (Kootenay River) NTS: 82G/06W
MINFILE No.: 82GSW062 Latitude: 49°26'09"
Map No.: L196 Longitude: 115°24'03"

A mass of limestone forms a hill 90 metres high on the east side of the Kootenay River, approximately 2 kilometres north of the highway bridge at Wardner. The limestone strikes west and dips south. On the southeast side of the hill the rock is coarse-grained, light brownish grey, high-calcium limestone. Fine-grained, dark grey limestone containing some silicified fossils and chert is exposed on the northeast side of the hill. Two analyses reported by Goudge (1944) are in Table 36.

Selected Bibliography

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 200, 202.

Kootenay River - East Side NTS: 82G/06W
MINFILE No.: 82GSW036 Latitude: 49°27'16"
Map No.: L197 Longitude: 115°25'43"

Limestone is exposed for 500 metres along a cliff adjacent to the Canadian Pacific Railway on the east side of the Kootenay River, 3.8 kilometres north of Wardner. It strikes 040° and dips 60° to 90° northwest.

The limestone is brownish grey and fine-grained. Chert is abundant near the south end of the exposure. An analysis reported by Goudge (1944) is in Table 36. This limestone was quarried and burnt in two lime kilns near the south end of the deposit prior to 1944. A mass of yellowish brown, sugary textured, magnesian limestone mixed with white calcite outcrops 800 metres north of the kilns.

Selected Bibliography

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 200, 202.

Kootenay River - West Side NTS: 82G/06W
MINFILE No.: 82GSW061 Latitude: 49°26'37"
Map No.: L198 Longitude: 115°28'47"

A ridge of coarse-grained, light grey limestone lies along the southwest side of the Kootenay River, 3 to 7.5 kilometres northwest of Wardner. It is folded about a northeast-plunging syncline (Höy and Carter, 1988). An analysis reported by Goudge (1944) is in Table 36.

Selected Bibliography

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 198, 202.

Bull River (Norkay) NTS: 82G/06W
MINFILE No.: 82GSW032 Latitude: 49°28'49"
Map No.: D020 Longitude: 115°29'13"

Dolomite was quarried 3.2 kilometres west-northwest of the town of Bull River, northeast of the Kootenay River. The quarry is developed in thickly bedded (greater than 3 metres) carbonates, striking 025° to 030° and dipping 25° southeast. These beds are quite variable in composition. They consist mostly of medium-grained, granular, flesh grey dolomite with some fine-grained siliceous material.

A narrow railway cutting, 1900 metres southeast of the quarry exposes a section of carbonate beds, striking 135° and dipping 20° northeast. The section is comprised of a 7.3-metre bed of coarse-grained, grey, magnesian limestone (Bed 1) underlain by 5.2 metres of earthy, crumbly weathering magnesian limestone (Bed 2). This bed is in turn underlain by a 3.7-metre bed of medium to coarse-grained, grey, high-calcium limestone (Bed 3) followed by brown magnesian limestone (Bed 4). Analyses reported by Goudge (1944) are in Table 36.

The quarry was operated by Cominco Ltd. between 1960 and 1962 to supply the company's iron reduction plant at Kimberly with dolomitic flux. A total of 17 835 tonnes of dolomite was quarried.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Anonymous (1962): untitled, unpublished report in Industrial Mineral File.

Canada Department of Mines and Resources:

Goudge, M.F. (1944): Limestones of Canada; Report 811, Part 5, pages 200, 202.

Northern Foreland Belt

Prime Lime and Marble

(Baker Creek) NTS: 93P/04W
MINFILE No.: 93P 023 Latitude: 55°09'09"
Map No.: L199 Longitude: 121°55'02"

This quarry is located on the northwest side of the Sukunka River, 2 kilometres north-northwest of its confluence with Baker Creek and 64 kilometres south-southwest of Chetwynd. The quarry is developed in a band of limestone trending northwest along the west limb of an overturned syncline. At the quarry thickly bedded homogeneous limestone striking 160° to 180° and dipping 75° to 85° west outcrops for 330 metres along the crest of a hogsback ridge with a minimum width of 45 metres. The limestone is overlain and underlain by less homogeneous, thinly bedded limestone.

The deposit is comprised of fine-grained (0.2 to 0.5 mm), light to dark brownish grey, massive but strongly fractured limestone. An average analysis is in Table 36. Subsequent drilling in 1986 defined reserves of 40 million tonnes ranging in composition from 52.5 per cent CaO (93.9 per cent $CaCO_3$) to 56.0 per cent CaO (99.9 per cent $CaCO_3$) (B. Ferguson, 1989, personal communication).

This deposit was quarried to produce limestone for paving asphalt mixes and for agricultural purposes by Prime Lime and Marble Co. Ltd. during 1984 and 1985. Peace River Lime Ltd. acquired the quarry in 1986, but failed to place the deposit into production. Northern Lime and Fertilizer Co. Ltd. of Vancouver had planned to begin quarrying operations in 1990. The company intended to supply limestone to pulp mills in northern Alberta and to agricultural markets in northern Alberta and northeastern British Columbia.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

Curry, J.D. (1983): The Baker Creek Limestone Prospect; unpublished report accompanying Notice of Opening - Quarries, filed by Prime Lime and Marble Ltd., in Industrial Mineral File.

Hora, Z.D. (1986): New Developments in Industrial Minerals; in Geological Fieldwork 1985, Paper 1986-1, page 239.

Mount Palsson (Baker Creek)

NTS: 93P/04W
MINFILE No.: 93P 003 Latitude: 55°08'34"
Map No.: L200 Longitude: 121°52'42"

The Mount Palsson deposit is situated on the southeast side of the Sukunka River, east of its confluence with Baker Creek, 64 kilometres south-southwest of Chetwynd, approximately 2.5 kilometres east-southeast of Prime Lime and Marble property (L199).

The deposit lies within a northwest-trending limestone band on the east limb of the same overturned syncline that hosts the Prime Lime and Marble deposit. Locally, the limestone is warped into a pair of closely spaced anticlines trending west-northwest.

The deposit is comprised of a chemical-grade limestone member that passes upward into an overlying impure limestone member. The chemical-grade member consists of white speckled micrite and brown to grey-brown, very fine grained, slightly dolomitic wackestone (detrital limestone). The impure member consists of brown-grey to grey, fine to coarse-grained, silty dolomitic wackestone with minor dolomitic micrite. Veins of white calcite are present in both units. Pyrobitumen is commonly present on fracture surfaces.

Two zones of reserves have been defined in the chemical-grade limestone along the crest of each of the two anticlines. The zones are separated by 80 to 90 metres of impure limestone preserved along the intervening syncline. Indicated and inferred reserves (in tonnes) with average grades (in per cent) are given as follows (MacLeod, 1988):

Zone	Reserves	CaO	MgO	SiO_2	Al_2O_3	Fe_2O_3
South	1 700 000	54.36	0.67	0.37	0.26	0.01
North	440 000	54.42	0.73	0.48	0.27	trace

The South Zone outcrops along the crest of the southern anticline over a length of 260 metres and a width of 80 to 100 metres. The North Zone outcrops for up to 160 metres along the crest of the northern anticline over a width of up to 100 metres.

The deposit was initially evaluated by Westmin Resources Limited in 1983 as a potential source of agricultural lime for the Peace River area. The property was subsequently optioned to Knox Western Capital Inc. of Calgary, Alberta. Knox Western Capital carried out detailed mapping and sampling in 1988 in order to determine the quantity and suitability of the limestone available for use in pulp and paper mills.

Selected Bibliography

British Columbia Ministry of Energy, Mines and Petroleum Resources:

MacLeod, W.A. (1988): Geological Report on the Westmin Lease No. 802015, Mount Palsson Area; unpublished report in Industrial Mineral File.

APPENDIX 1: MINFILE LISTINGS

Not all the known limestone and dolomite occurrences in British Columbia are described in this report, because of the poor quality of some and the lack of detailed information on others. Listings of all limestone and dolomite occurrences contained in MINFILE are presented here. The MINFILE database presently contains listings for 368 limestone and 38 dolomite occurrences, most of which were compiled from the two unpublished reports Limestone Occurrences in British Columbia (1973) and Dolomite Occurrences in British Columbia (1980). Separate lists are given for limestone and dolomite. Some carbonate deposits contain both commodities and some of the occurrences therefore appear in both lists. Occurrences are listed by MINFILE number in numerical order. Map numbers of occurrences described in this report are also given. Colour, composition and production status are also indicated. It should be noted that average grades and reserves for relatively undeveloped deposits may not have been rigorously calculated and may not be reliable.

The MINFILE numbering system is based on the National Topographic System grid. The first four characters of a MINFILE number designate the 1:250 000 map sheet on which the occurrence is located. Occurrences within a map sheet are numbered sequentially from 001 to 999 (*e.g.* 092F 100). Some 1:250 000 map sheets in southern British Columbia have more than 999 listings and are therefore divided into four quadrants (NE, NW, SE, SW) identified in the MINFILE number (*e.g.* 082FSW 200).

Because the MINFILE numbering system follows the N.T.S. grid the listings can be used to locate occurrences by first determining the N.T.S. map sheet covering the area of interest. The occurrences located in that particular map area can then be easily looked up. For example, reference to the index map (Map 1, in pocket) shows that most of northern Vancouver Island is covered by N.T.S. map sheet 092L. Thus, limestone and dolomite occurrences on northern Vancouver Island have MINFILE numbers beginning with 092L.

LISTING OF LIMESTONE OCCURRENCES IN MINFILE BY MINFILE NUMBER (as of February, 1991)

Information on the occurrences listed below can be obtained from the MINFILE Subsection of the Geological Survey Branch [#201, 553 Superior St. Victoria, B.C. (604) 356-2826].

The listings below can be obtained electronically from MINFILE in the form of a DBASE 3 PLUS file titled LIMESTON.DBF.

Column C - Colour Index :

1 = White
2 = White to light grey
3 = White grading to medium grey to black or bluish grey
4 = Grey or bluish grey
5 = Grey to black
6 = Black
7 = Buff, brown or buff/brownish grey

Column S - Composition Index:

(for occurrences with published sample data or reserve estimates)
1 = High-calcium [at least 95% $CaCO_3$ (53.2% CaO), up to 2% $MgCO_3$ (0.96% MgO)]
2 = Calcium [at least 75% CaCO3 (42.0% CaO), less than 10 % $MgCO_3$ (4.79% MgO)]
3 = Magnesium [10-40% $MgCO_3$ (4.79-19.5% MgO)]
4 = Dolomitic (dolostone) [40-45.72% $MgCO_3$ (19.5-21.86% MgO)]
5 = Impure (argillaceous/siliceous) [less than 75% $CaCO_3$ (42.0% CaO)]

Column P - Production Status:

C indicates current production (as of 1990)
P indicates past production
A indicates active prospect in 1988, 1989 or 1990

MINFILE NO.	MAP NO.	NAME	NTS SHEET	LATITUDE	LONGITUDE	C	S	P
082ENE062		Franklin Camp	082E/09W	49°33'23"	118°22'58"	3		
082ENW016		Peachland	082E/13E	49°46'52"	119°44'3"	4		P
082ESE210	L190	Midway - West Lens	082E/02W	49° 1'30"	118°51'21"	3	2	P
082ESE211	L181	Broadwater	082E/08E	49°28'2"	118°5'7"	3	2	P
082ESE226	L177	Boundary Falls	082E/02E	49°3'8"	118°41'13"	3	1	P
082ESE228	L188	Deadwood Creek	082E/02E	49°6'46"	118°43'0"	3	1	
082ESE229	L191	Eholt	082E/02E	49°8'13"	118°32'44"	2		
082ESE230	L186	Hardy Creek	082E/01W,02E	49°3'1"	118°29'20"	5	2	P
082ESE231	L187	Marguerite	082E/02E	49°7'13"	118°42'4"	3	1	P
082ESE232	L189	Oro Denoro	082E/02E	49°7'19"	118°32'38"	2	2	
082ESE233		Thimble Mtn. - East	082E/02E	49°7'22"	118°31'14"	3	2	
082ESE234		Thimble Mtn. - West	082E/02E	49°7'55"	118°32'2"	4	2	
082ESE235	L190	Midway - East Lens	082E/02W	49°1'11"	118°50'13"	4	1	
082ESE237	L176	Lime Creek	082E/01W	49°8'57"	118°27'30"	4	2	P
082ESE238	L180	Fife	082E/01E	49°4'18"	118°12'21"	3	2	P
082ESW085	L146	Olalla Creek	082E/05W	49°17'23"	119°52'51"	3	2	P
082FNE139		Kokanee	082F/10W	49°42'10"	116°48'45"	3		
082FNE155	L172	Proctor	082F/10W	49°37'13"	116°55'27"	2	3	P
082FNE156	L178	Ainsworth	082F/10W, 15W	49°46'7"	116°56'31"	3	2	
082FNE157	L161	Riondel	082F/15W	49°45'40"	116°51'30"	2		P

082FNE158		Kaslo Marble	082F/15W	49°55'2"	116°51'55"3	3		P
082FNE164		La France Creek	082F/10W	49°31'41"	116°46'21"			P
082FNW258		Keen Creek	082F/14E	49°55'7"	117°0'37"	1	2	
082FSW014		Hunter	082F/06E	49°14'15"	117°9'58"			P
082FSW015		Double Standard	082F/06E	49°14'25"	117°10'14"			P
082FSW215	L155	Swift Creek	082F/03W	49°4'6"	117°16'55"	3	2	P
082FSW253	L170	Purex Lime (Nelway)	082F/03W	49°0'56"	117°17'22"	3	1	P
082FSW262	L157	Wallack Creek	082F/03W	49°2'23"	117°19'24"	4	2	
082FSW289		Sheep Creek Marble	082F/03E	49°8'35"	117°10'51"		2	P
082FSW292	L175	Pend d'Oreille	082F/03W, 04E	49°2'49"	117°28'55"	2	2	
082FSW307	L154	Lost Creek	082F/03E	49°4'54"	117°14'27"	1	2	C
082FSW337		Reno	082F/03E	49°11'2"	117°7'46"			P
082FSW338		Waneta	082F/04E	49°10'24"	117°36'56"	4	2	
082FSW339	L156	South Salmo River	082F/03W	49°4'39"	117°15'45"	3	1	
082GSW032	D020	Bull River	082G/06W	49°28'49"	115°29'13"	4	3	P
082GSW036	L197	Kootenay River East	082G/06W	49°27'16"	115°25'43"	7	1	P
082GSW061	L198	Kootenay River West	082G/06W	49°26'37"	115°28'47"	3	2	
082GSW062	L196	Wardner North	082G/06W	49°26'9"	115°24'3"	7	1	
082GSW063	L195	Wardner South	082G/06W	49°24'36"	115°25'17"	4	3	
082KNW226	L171	Sidmouth	082K/12W	50°43'30"	117°57'30"	1	1	P
082KSE076	L158	Marblehead Marble	082K/07W	50°15'38"	116°58'20"	3	2	P
082KSE077	L159	Lardeau	082K/02W	50°9'40"	116°57'32"	3	2	P
082KSE082	L160	Schroeder Creek	082K/02W	50°2'5"	116°54'34"	4	2	P
082KSW073		Pingston Creek	082K/05W	50°24'46"	117°55'59"	3		
082LNE041	D012	Walled Claims	082L/10E	50°36'37"	118°38'5"	2		
082LNE042		Sicamous	082L/15W	50°49'58"	118°59'35"	3	5	
082LNW064	L183	Blind Bay	082L/14W	50°52'47"	119°22'12"	4	2	
082LNW075	L185	Sorrento	082L/14W	50°52'40"	119°25'35"	4	2	
082LNW086	L184	Grindrod	082L/11E	50°37'33"	119°8'57"	6	2	
082LNW087	L182	Salmon Arm	082L/11E	50°42'19"	119°12'2"	1	1	
082LNW088		Shuswap	082L/14E	50°55'58"	119°4'5"			P
082LSE049	L115	Monashee Pass	082L/02E	50°6'29"	118°30'33"	3	2	
082LSE050	L112	Camel's Hump	082L/02W	50°13'47"	118°52'41"	4	2	
082LSE058	L113	Creighton Valley	082L/02W	50°12'25"	118°54'2"	2	2	
082LSW014		Fintry Point	082L/04E	50°8'27"	119°34'6"	3	1	
082LSW049	L118	Westwold	082L/05W	50°26'48"	119°49'23"	1	1	P
082LSW084	L193	Highway 6	082L/03E	50°14'37"	119°14'23"	4	2	
082LSW094		Lavington	082L/03E	50°12'51"	119° 5'38"	3	5	
082LSW095	L121	Salmon River North	082L/05E	50°28'55"	119°41'5"	4	2	
082LSW096	L124	Salmon River South	082L/05E	50°27'53"	119°40'26"	6	5	
082LSW097	L114	Vernon	082L/06W	50°15'24"	119°18'33"	4	2	P
082LSW098	L135	Armstrong	082L/06E	50°28'38"	119°13'47"	3	1	P
082LSW099		Kendry Creek	082L/06E	50°27'35"	119°7'18"	2	2	P
082LSW112	L136	Bald Range	082L/4, 82E/13	50°2'6"	119°33'55"	1	1	A
082M 181		Adams Lake	082L/04E	51°7'18"	119°40'13"	2		
082M 182	L163	Vavenby	082M/12E	51°35'40"	119°44'40"	2	1	P
082M 183	L164	Onyx Creek	082M/03W	51°2'19"	119°17'7"	2		
082N 072	L162	Albert Canyon	082N/04W	51°9'5"	117°49'42"	4	3	P
082N 084		Vermilion Pass	082N/01E	51°14'0"	116° 4'0"		1	
083D 044	L192	Blue River Calcite	083D/03W	52°7'40"	119°18'40"	1	2	A
092B 005	L034	Bamberton	092B/12E	48°35'12"	123°31'25"	4	1	P
092B 006	L040	Tod Inlet/Quarry L.	092B/11W	48°33'58"	123°28'19"	5	1	P
092B 017	L003	Bonner's Quarry	092B/12E	48°41'16"	123°36'27"	4	3	P
092B 018		Cobble Hill, Lot 11	092B/12E	48°41'1"	123°36'43"			
092B 019	L005	Raymond	092B/12E	48°40'35"	123°38'28"	4	1	P
092B 020	L055	Parsons Bridge	092B/06W	48°27'13"	123°27'26"	4	2	P
092B 021	L053	Wrigglesworth Lake	092B/12E	48°31'14"	123°34'27"	3	1	
092B 022	L054	Malahat (Jefford)	092B/12E	48°32'42"	123°36'31"	3	1	P
092B 023		Devereux Lake	092B/12E	48°32'13"	123°36'24"	3		
092B 024	L050	Rosebank	092B/06W	48°26'37"	123°27'29"	3	1	P
092B 025	L051	Millstream	092B/05E	48°28'55"	123°30'25"	2		P
092B 026	L052	Atkins Road	092B/06W	48°26'58"	123°28'24"	4	1	P
092B 118	L006	Eagle Heights	092B/12E	48°39'55"	123°44'4"	4	2	
092B 119		Wild Deer Creek	092B/12W	48°32'13"	123°36'24"			
092B 120		Skutz Falls	092B/13W	48°45'6"	123°57'47"			
092B 139		Palmer Station	092B/06W	48°27'33"	123°26'47"	4		P
092C 010	L056	Nitinat Southeast	092C/10W	48°41'24"	124°47'57"	4		
092C 011	L057	Nitinat Northwest	092C/10W	48°41'49"	124°48'49"	1	1	
092C 015		Fairservice Creek	092C/16E	48°47'57"	124° 2'46"	2		

092C 016	L004	Marble Bay	092C/16E	48°50'11"	124°7'13"	2	2	
092C 084	L032	Spencer Creek	092C/15W	48°57'58"	124°51'10"	4	1	
092C 085	L036	Harris Creek	092C/09E	48°41'23"	124°14' 0"	5	1	
092C 086	L037	Gordon River	092C/16W	48°45'51"	124°20'31"	5	1	
092C 087	L038	Nixon Creek	092C/16W	48°50'17"	124°28'38"	5	1	
092C 118		Dixon Island	092C/14E	48°51'11"	125°7'7"			
092C 122		Ucluelet	092C/13E	48°56'53"	125°34'23"	1		
092C 131		Ecoole Harbour	092C/14E	48°58'13"	125°4'0"	1		
092C 132		Marble Cove	092C/14E	48°54'57"	125°6'12"			
092C 133		Poett Nook	092C/14E	48°52'55"	125°3'38"			
092C 134		Sarita River	092C/15W	48°53'30"	124°59'8"			
092C 135		Tzartus Island	092C/14E	48°56'45"	125°2'58"			
092C 136		Uchucklesit	092C/15W	48°59'8"	124°58'28"			
092E 020	L030	Nootka Marble	092E/15E, 10E	49°45'0"	126°30'30"	2	1	P
092E 058		Muchalet Inlet	092E/09	49°38'30"	126°15'0"			
092E 059		Tahsis Inlet	092E/15E	49°52'36"	126°38'24"			
092E 060		Sidney Inlet	092E/09W	49°30'30"	126°17'0"			
092E 061		Tlupana Arm	092E/16W	49°46'0"	126°31'15"			
092E 070		Tahsis	092E/15E	49°57'0"	126°40'31"		3	
092F 075		Iron Hill	092F/13E	49°51'45"	125°32'40"	2	1	
092F 088	L002	Anderson Bay	092F/09E	49°31'0"	124°8'33"	3	2	P
092F 089	L001	Horne Lake	092F/07W	49°21'35"	124°43'47"	4		
092F 090		Big Interior Mtn.	092F/05E	49°27'22"	125°34'13"	2		
092F 091		Beauty Lake	092F/05E	49°25'55"	125°31'32"	2		
092F 092		Mount Septimus	092F/05E	49°28'52"	125°31'27"	2		
092F 093		Price Creek	092F/05E	49°29'52"	125°30'34"	2		
092F 094		Della Lake	092F/05E	49°26'40"	125°32'52"	2		
092F 095	L017	Marble Bay	092F/15E	49°45'35"	124°33'53"	5	2	P
092F 097		Upper Campbell Lake	092F/13E	49°57'51"	125°37'24"			
092F 098		Greenstone Creek	092F/13E	49°59'56"	125°37'47"			
092F 100	L062	Nelson Island	092F/09E	49°44'36"	124°9'0"	1	1	P
092F 101		Hardy Island	092F/09E	49°44'42"	124°9'41"	1		
092F 102		Dinner Rock	092F/15E	49°56'34"	124°42'24"	2		
092F 104	L014	Davie Bay	092F/09W	49°36'25"	124°21'55"	4	2	
092F 127		Ballenas Island	092F/08E	49°15'56"	124°9'8"	4		
092F 139	L008	White-rock/Paxton L.	092F/10E	49°42'30"	124°31'44"	1	1	C
092F 190	L033	Kennedy Lake East	092F/03W, 04E	49°3'46"	125°28'53"	3	1	
092F 191	L039	Kennedy Lake West	092F/04E	49°3'17"	125°36'24"	4	1	
092F 259		Lake	092F/10E	49°42'10"	124°31'37"	6	1	
092F 298		Mount Con Ried	092F/12E	49°57'29"	126°0'11"			
092F 349		Mount McBride	092F/12E	49°41'37"	125°39'33"			
092F 351		Marble Peak	092F/12E	49°39'45"	125°33'56"			
092F 352		White Ridge	092F/13W	49°46'11"	125°57'27"			
092F 353		Quinsam Lake	092F/13E	49°51'2"	125°31'9"			
092F 363	L013	Will Claims	092F/10E	49°43'53"	124°31'14"	5	1	
092F 394	L012	Imperial Limestone	092F/10E	49°44'28"	124°31'35"	3	1	C
092F 395	L008	Ideal Cement	092F/10E	49°43'9"	124°33'46"	5	1	C
092F 396	L010	Lafarge/Beale	092F/10E,15E	49°45'2"	124°31'41"	5	1	P
092F 397	L011	Hiesholt Lake	092F/15E	49°46'9"	124°35'37"	6	1	P
092F 407		Limekiln Bay	092F/15E	49°47'20"	124°37'39"	5	2	P
092F 408		Nanaimo River	092F/01W	49°4'58"	124°23'21"			
092F 409		Mount Spencer	092F/02E	49°2'58"	124°36'54"			
092F 410		Parsons Creek	092F/02W	49°1'2"	124°49'38"			
092F 411		Hecate Mountain	092F/02W	49° 0'17"	124°56'44"			
092F 412	L041	Sproat Lake	092F/02W	49°13'4"	124°58'11"	4		
092F 413		Uchucklesit Inlet	092F/03E	49°1'46"	125° 0'59"			
092F 414	L035	Effingham Inlet	092F/03E	49° 2'38"	125°10'57"	3	2	P
092F 416		Nahmint Mountain	092F/03W	49°11'2"	125°16'28"			
092F 417		Clayoquot Arm North	092F/03W	49°13'44"	125°27'25"			
092F 418		Mount Maitland	092F/03W	49°8'5"	125°30'24"			
092F 419		Clayoquot Arm East	092F/04E	49°9'54"	125°32'53"			
092F 420		Deer Bay	092F/05E	49°14'31"	125°35'1"			
092F 421		Herbert Inlet	092F/05W	49°20'58"	125°55'51"			
092F 422	L007	Buttle Lake	092F/12E	49°39'13"	125°31'15"	4	2	
092F 423		Great Central Lake	092F/06W	49°24'41"	125°26'54"			
092F 471	L015	B.C. Cement	092F/15E	49°48'5"	124°36'16"	5	1	P
092F 472		Beale	092F/10E	49°43'6"	124°31'50"			P
092F 473		Coulter	092F/15E, 10E	49°45'03"	124°33'19"	1		P
092F 474	L019	Fogh Property	092F/15E	49°47'31"	124°36'15"	3	2	P

092F 475		Handy Creek	092F/02W	49°2'18"	124°57'3"			
092F 476	L020	Johnson Quarries	092F/10E	49°44'24"	124°33'20"	5	2	P
092F 477	L018	Eagle Bay	092F/15E	49°46'13"	124°34'40"	4	1	
092F 478		Mount Dick	092F/09E	49°30'3"	124°9'26"	4		
092F 479	L009	Blubber Bay	092F/15E	49°47'8"	124°37'17"	5	1	C
092F 495	L016	December Claims	092F/10E	49°44'13"	124°32'42"	3	2	
092GNW001		McNaughton Point	092G/12W	49°33'53"	123°59'59"			
092GNW002		Thornhill Creek	092G/12E	49°37'25"	123°35'19"	1		
092GNW031	D002	Candol (Sechelt)	092G/12W	49°36' 4"	123°53'14"	3	1	
092GNW052		Snake Bay	092G/12W	49°30'47"	124°48'56"	3	2	C
092HNE066	L141	Law's Camp	092H/10W	49°33'54"	120°54'10"	1	1	
092HNE182	L140	Harmon Lake	092H/15E	49°59'18"	120°41'21"	4	1	
092HNW062	L131	Saddle Rock	092H/11W	49°37'58"	121°23'35"	4	2	P
092HSE149	L137	Hedley	092H/08E	49°21'14"	120°4'3"	4	2	P
092HSE169		BC Portland Cement	092H/08W	49°28'48"	120°28'25"	3	2	P
092HSW009	L083	Popkum Limestone	092H/04E	49°11'57"	121°43'5"	4	2	P
092HSW088	L082	Chilliwack South	092H/04E	49°4'35"	121°42'38"	4	2	
092HSW089	L081	Chilliwack North	092H/04E	49°5'33"	121°42'0"	4	2	
092HSW122	L132	Sumallo River	092H/03E	49°13'11"	121°5'32"	3		
092HSW123	L084	Agassiz	092H/04W	49°13'17"	121°47'55"	4	2	P
092HSW124	L085	Bear Mountain	092H/05	49°17'29"	121°45'0"	3	2	
092HSW131		Skagit River	092H/03E	49°3'36"	121°9'24"			
092HSW132		Mount Coulter	092H/06W	49°17'41"	121°16'59"			
092INE001	L116	Lafarge Canada	092I/09E	50°40'15"	120°3'56"	4	1	C
092INE160	L123	Rayleigh South	092I/16W	50°46'42"	120°18'19"	4	2	P
092INE161	L120	Jamieson Range	092I/16W	50°59'12"	120°16'19"	2	1	
092INE173	L122	South Thompson R.	092I/09E	50°40'20"	120°7'43"	4	1	
092INE174	L117	Mount Harper	092I/09E	50°42'48"	120°5'50"	4	2	
092INE175	L119	Black Pines	092I/16W	50°55'24"	120°15'45"	2	2	P
092INE176		Sullivan Lake	092I/16E	50°59'25"	120°10'55"	2		
092INE177		Rayleigh North	092I/16W	50°49'34"	120°16'59"	4		
092INW078	L144	Walhachin	092I/14E, 11E	50°45'30"	121° 1'55"	4	2	
092INW079	L093	Cornwall Creek	092I/11W	50°43'31"	121°19'59"	4	1	
092INW080	L138	Martel	092I/11W	50°30'38"	121°17'1"	5	1	
092INW081	L086	Marble Canyon	092I/13E	50°49'4"	121°39'11"	2	1	C
092INW082	L145	Rattlesnake Hill	092I/14E	50°45'49"	121°12'0"	2	2	
092INW097	L090	Anderson Creek	092I/12	50°43'6"	121°41'48"	4	1	
092INW098	L091	Langley Lake	092I/12E	50°40'35"	121°33'51"	4	2	
092INW099	L092	Robertson Creek	092I/13E	50°52'5"	121°34'49"	4	2	
092INW100	L095	Maiden Creek	092I/13E	50°55'29"	121°33'33"	4	2	
092INW101	D005	Pavilion Mountain	092I/13E	50°59'15"	121°43'59"	4		
092ISE098	L142	Swakum Mountain	092I/07E	50°17'19"	120°41'19"	7	2	
092ISE144	L139	Promontory Hills	092I/02W	49°15'14"	121° 1'42"	4	2	
092ISE145	L143	Nicola Lake	092I/02E	50°7'35"	120°34'29"	4	1	
092JNE122		Meade Lake	092J/15W	50°47'22"	122°46'52"	4		P
092JNE123	L133	Marshall Ridge	092J/15E	50°53'17"	122°34'56"	1		
092JNE143	L134	Piebiter Creek	092J/10E	50°43'21"	122°38'54"	3	1	
092K 001		Toba Inlet	092K/08W	50°28'10"	124°22'26"	4		
092K 002	L065	West Redonda Island	092K/07W	50°17'11"	124°51'0"	3	3	P
092K 003		Pryce Channel	092K/07W	50°19'2"	124°51'53"			
092K 004	L066	Bold Point	092K/03E	50°10'34"	125°10'20"	4	1	
092K 005	L042	Open Bay	092K/03E	50°8'25"	125°12'27"	5	2	
092K 032		Knight Inlet	092K/12W	50°43'0"	125°50'13"	4		
092K 136	L063	Frederick Arm	092K/06W	50°27'45"	125°17'55"	4	2	
092L 044	L022	Merry Widow-Empire	092L/06W	50°21'20"	127°15'7"	3	2	A
092L 109	L023	Bonanza Lake East	092L/07W	50°24'52"	126°48'20"	3	1	A
092L 151	L021	Jeune Landing	092L/05, 06, 11	50°27'33"	127°31'8"	3	2	P
092L 152	L043	Harbledown Island	092L/10E	50°33'55"	126°30'54"	4	2	
092L 186	L025	Tsulton(Nimpkish L.)	092L/07W	50°25'10"	126°57'16"	3	1	A
092L 187	L049	Kashutl Inlet	092L/03W	50°9'23"	127°18'56"	2	1	
092L 214	D001	Zeballos Dolomite	092L/02W	50°2'30"	126°47'10"	3	3	
092L 267	L026	Fox	092L/12W	50°37'13"	127°56'3"	3	2	
092L 279	L027	Beaver Cove	092L/10W	50°31'0"	126°53'30"	3	1	P
092L 280	L024	Bonanza Lake West	092L/07W	50°24'4"	126°48'51"	3	1	A
092L 282	L028	Port McNeill (Eric)	092L/11E	50°33'25"	127°3'40"	2	1	P
092L 283	L044	Cluxewe River	092L/11E	50°33'2"	127°8'45"	5	1	P
092L 284		Marble River	092L/06W	50°26'20"	127°23'45"	5	3	P
092L 285	L029	Hankin Point	092L/12E	50°35'8"	127°33'6"	4	2	
092L 286		Quatse Lake	092L/12E	50°38'26"	127°32'8"	4	1	

092L 287	L031	Kains Lake	092L/12E	50°41'59"	127°39'56"	1		
092L 295	L022	Benson Lake	092L/06W	50°23'0"	127°15'7"	2	1	C
092L 339	L023	Leo D'Or	092L/07W	50°23'47"	127°47'47"	3	1	A
092M 008	L059	Smith Inlet	092M/06E	51°22'0"	127°8'46"	1	2	P
092M 011	L064	Sandell Bay	092M/12E	51°39'18"	127°32'17"	2	1	
092M 012	L060	Koeye River	092M/13W	51°46'56"	127°51'36"	3	1	P
092M 013	L061	King Island	092M/13W	51°56'1"	127°52'25"	2	2	P
092M 014		Owikeno Lake	092M/10W	51°39'49"	126°53'47"	1		
092M 016	L067	Kilbella Bay	092M/11W	51°40'55"	127°21'53"	1	1	
092O 078		Hanceville	092O/15W, 14E	51°52'50"	122°56'21"	4		
092O 079		Springhouse Hills	092O/16	51°55'5"	122°12'4"			
092P 079	L094	Clinton	092P/04E	51°4'38"	121°38'15"	4	2	P
092P 142	L088	Jesmond Quarry	092P/04W	51°7'15"	121°51'31"	3	1	
092P 150	L089	Bowden Creek	092P/04E	51°2'47"	121°41'9"	3	1	P
092P 171	L087	Kelley Lake	092P/04W	51°4'52"	121°49'7"	3	1	
093A 144		Roundtop Mountain	093A/14W	52°55'39"	121°16'52"	5		
093A 145		Mount Kimball	093A/14E	52°57'48"	121°3'39"			
093A 146		Mitchell River	093A/16W, 09W	52°49'12"	120°19'42"			
093B 040		Chimney Creek	093B/01W	52°3'48"	122°16'24"		4	
093D 008	L058	Beale's Quarry	093D/04W	52°11'19"	127°58'55"	1	1	P
093F 042		Kluskoil Lake	093F/01, 93G/4	53°10'35"	124°0'7"		4	
093G 008	L097	Vanderhoof	093G/13	53°59'35"	123°44'49"	3	1	A
093G 032	L096	Dahl Lake Quarry	093G/14W	53°47'31"	123°17'11"	5	1	C
093G 042	L148	Beverley	093G/15W	53°45'48"	122°56'0"	4	2	P
093H 017	L165	Ptarmigan Creek	093H/10W	53°40'46"	120°54'30"	4	1	P
093H 020	L168	Highway 16	093H/13E	53°53'47"	121°41'38"	6	1	
093H 030		Purden Lake	093H/13W	53°57'32"	121°58'47"	P		
093H 066		Iltzul Ridge	093H/03E	53°7'38"	121°12'54"			
093H 067		Cunningham Pass	093H/03W, 04E	53°4'40"	121°26'11"	4		
093H 068		Isaac Lake	093H/02W, 07W	53°15'16"	120°55'56"			
093H 069		Grand Canyon	093H/13E	53°56'24"	121°38'42"			
093H 073	L166	Bowron River	093H/12E	53°42'40"	121°41'38"	3	1	P
093I 006	L167	Hansard	093I/04W	54°5'45"	121°53'21"	5	1	P
093J 015	L173	Redrocky Creek	093J/10E	54°37'56"	122°42'16"	5	1	P
093J 016		Mile 72 (McLeod L.)	093J/15W	54°48'42"	122°48'18"	6	5	P
093J 017	L174	Angusmac	093J/10E	54°37'42"	122°37'54"	6	2	
093J 019	L169	Tacheeda Lakes	093J/10E	54°43'0"	122°31'44"	5	2	P
093J 025		Giscome Limestone	093J/01W	54°03'39"	122°17'35"	4	1	C
093K 022	L105	Pinchi Lake	093K/09W	54°37'30"	124°24'30"	3	2	
093K 023	L101	Stuart Lake North	093K/08W	54°28'30"	124°19'27"	4	1	P
093K 051	L099	John (Necoslie R.)	093K/08E	54°22'5"	124°5'53"	4	2	
093K 057		Thur (Pinchi)	093K/10E	54°37'41"	124°33'35"			
093K 085	L098	Necoslie River	093K/08E	54°23'1"	124°7'51"	4	1	P
093K 092	L100	Stuart Lake South	093K/08W	54°27'37"	124°17'47"	4	1	P
093L 306	L129	Cart & Lime	093L/16W	54°53'31"	126°18'20"	2		A
093L 307		Chris	093L/09E	54°44'42"	126°12'54"	2		A
093L 308	L147	Calcite (Fulton L.)	093L/16E	54°49'0"	126°17'18"	2		A
093N 186	L102	Indata Lake	093N/06	55°17'34"	125°15'54"	7	1	
093N 187	L103	Kwanika Creek	093N/06E, 11E	55°29'47"	125°21'15"	7	1	
093N 198	L104	Bralorne	093N/11W	55°34'4"	125°23'37"	3	1	
093N 199	L106	Vital Creek	093N/11W	55°43'6"	125°28'12"	4	1	
093O 017		Mount Murray	093O/07W	55°27'36"	122°45'1"5	5		
093O 018		Solitude Mountain	093O/10E, 07E	55°30'5"	122°37'50"	6	5	
093O 019		Silver Sands	093O/10E	55°31'14"	122°32'0"	6	5	
093O 020		Peace River	093O/14E	55°53'18"	123°12'3"			
093O 039	L179	McKenzie (Bend)	093O/03E	55°10'17"	123°11'57"	7	1	P
093O 040		Chin Claims	093O/02W	55°0'11"	122°54'18"	2		A
093P 003	L200	Mount Palsson	093P/04W	55°8'34"	121°52'42"	7	1	
093P 023	L199	Prime Lime	093P/04W	55°9'9"	121°55'2"	7	1	P
094C 085	L151	Ositinka River	094C/03E	56°9'34"	125°5'36"	4	1	
094C 086	L150	Lookout Hill	094C/11E	56°41'12"	125°10'15"	3	1	
094C 087	L153	Mount Lay	094C/12E, 11W	56°34'25"	125°30'1"	7	2	
094C 088	L152	Swannell River	094C/12W	56°34'43"	125°45'19"	4	2	
094C 089	L149	Butler Range	094C/11E	56°37'16"	125°4'45"	4	1	
094K 087	L194	Penny (Toad River)	094K/12E	58°43'26"	125°40'56"	1	1	A
103A 001	L068	Laredo Limestone	103A/11E	52°41'16"	129°2'55"	1	1	P
103A 006		Suzette Bay	103A/08W	52°24'12"	128°26'45"			
103A 007	L080	Princess Royal I.	103A/15E	52°54'8"	128°31'27"	1	1	P
103B 059		Kungkit Island	103B/03E	52°6'0"	131°4'20"	4		

103B 060	L045	Kunga Island	103B/13E	52°45'40"	131°34'20"	4	1	
103B 061	L046	Limestone Island	103B/13E	52°54'30"	131°36'40"	4	1	
103F 038	L047	Gillatt Arm	103F/01E	53°2'45"	132°1'47"	3	2	
103F 039	L048	Sandilands Island	103F/01E	53°10'20"	132°5'10"	4		
103F 040		Mosquito Lake	103F/01E	53°4'20"	132°7'20"			
103G 007	L047	Cumshewa Inlet	103F/1, 103G/4	53°2'17"	132°00'25"			
103G 010		Gurd Island	103G/15E	53°53'40"	130°39'50"	1		
103G 014		Lewis Island	103G/16E	53°59'50"	130°14'0"	1	2	
103G 017		Deadman Inlet	103G/09W	53°37'50"	130°29'20"			
103G 046	L075	Colby Bay	103G/09	53°34'27"	130°15'33"	1		
103H 038	L070	Limestone Bay	103H/05W	53°26'31"	129°58'35"	1	2	
103H 039	L071	Banks I. (Lot 2224)	103H/05W	53°23'59"	129°55'3"	1	1	
103H 059		Work Island	103H/02E	53°10'38"	128°40'58"			
103H 060		Gil Island	103H/03W	53°5'0"	129°16'30"	1		
103H 061		Dewdney Island	103H/04E	53° 1'8"	129°37'30"			
103H 062	L077	Banks I. (Lot 797)	103H/05W	53°15'40"	129°48'9"	1		
103H 063	L074	Marmor	103H/01E	53°6'29"	128°12'23"	4		
103H 073	L069	Kumealon Inlet	103H/13W	53°52'49"	129°59'46"	3	1	
103I 009	L126	Barr Quarry(Shames)	103I/07W	54°25'31"	128°53'43"	3	2	P
103I 010		Autum	103I/07W	54°26'25"	128°50'10"			
103I 113	L127	Mayner's Fortune	103I/07E	54°24'34"	128°39'18"	1	2	
103I 165	L125	Terrace Calcium	103I/09W	54°30'42"	128°28'18"	1	1	P
103I 197	L128	Dardanelle	103I/08E	54°28'54"	128°12'9"	1		
103I 198		Mount Attree	103I/08W	54°26'4"	128°18'57"			
103I 199		Mount Layton	103I/08W	54°25'12"	128°28'36"	1		
103I 200		Zymoetz River	103I/09W	54°31'33"	128°25'3"	1	2	
103I 201		Redcap Mountain	103I/12W	54°43'0"	129°45'30"			
103I 223		Terrace Airport	103I/07E	54°27'56"	128°41'5"	7		
103J 001		Pearse Island	103J/16W	54°47'20"	130°23'0"			
103J 002		Wales Island	103J/10E	54°42'50"	130°33'10"			
103J 003		Dundas Island	103J/10W	54°36'20"	130°52'10"			
103J 004		Grace Point	103J/09W	54°34'50"	130°20'30"			
103J 011	L076	Frederick Point	103J/08W	54°15'20"	130°21'40"	3		
103J 012	L078	Smith Island	103J/01E	54°10'10"	130°12'10"	1	1	P
103J 025		Elliot Island	103J/01W	54°2'30"	130°16'0"	1		
103J 029		Porcher Island	103J/01W	54°4'0"	130°21'0"	1		
103J 032	L079	Hanmer Island	103J/01E	54°3'25"	130°15'0"	3	2	
103J 034		Clough	103J/01E	54°0'30"	130°5'0"			
103J 036		Father Point	103J/09W	54°39'20"	130°26'10"			
103J 037		Randall Island	103J/07W	54°29'50"	130°46'20"	7		
103J 038		Dunira Island	103J/07W	54°26'40"	130°45'10"	7		
103J 039		Devastation Island	103J/08W	54°19'15"	130°29'10"	7		
103J 040		Digby Island	103J/08W	54°18'30"	130°27'0"	3		
103O 017	L072	Swamp Point	103O/08E	55°28'29"	130°2'30"	3	1	P
104G 102	L130	Scud River	104G/03, 04, 05	57°10'0"	131°20' 0"	3		
104G 104		Iskut River	104G/01, 02, 07	57°3'22"	130°23'30"			
104G 105		Tahltan Lake	104G/13E	57°56'0"	131°37'45"			
104G 106		Klastline	104G/15E	57°57'11"	130°41'40"			
104H 018		Klastline Plateau	104H/13W	57°50'31"	129°48'5"			
104H 019		Stikine River	104H/13W	57°59'34"	129°45'0"			
104H 023		Tsaybare Mountain	104H/13W	57°58'47"	129°49'29"			
104I 089		Tanzilla Butte	104I/05	58°24'32"	129°44'10"			
104I 090		Turnagain River	104I/09W, 10E	58°35'46"	128°26'12"			
104I 091		Moose Lakes	104I/12W	58°37'28"	129°58'7"			
104J 039		Tanzilla Valley	104J/02, 01, 07	58°12'4"	130°34'4"			
104J 040		Sheslay River	104J/05W	58°19'55"	131°50'45"			
104J 041		Dease Lake	104J/08E	58°26'53"	130°4'59"			
104J 042	L109	French Range	104J/09, 10, 16	58°40'0"	130°35'20"	4		
104J 045	L111	Nahlin River	104J/13W	58°48'21"	131°51'21"	4		
104K 069		Tatsamenie	104K/08E	58°17'30"	132°8'30"	4		
104K 070		Kowatua Creek	104K/08W, 07E	58°28'58"	132°28'44"	4		
104K 071		Nahlin Mountain	104K/16W	58°55'56"	132°23'7"			
104K 072		Sinwa (Inklin R.)	104K/14	58°51'18"	133°16'0"	4		
104M 032		Bennet Lake	104M/15W	59°57'9"	134°57'32"			
104M 033	L108	Talaha Bay	104M/16E	59°58'29"	134°8'7"	4		
104N 081		Atlin Road	104N/13W	59°59'0"	133°47'30"			
104N 082		Hurricane Creek	104N/08W	59°20'50"	132°26'0"			
104N 094	L107	Nakina River	104N/02, 07, 08	59°11'0"	132°44'0"	4		
104N 095		O'Donnel River	104N/05E	59°19'30"	133°31'0"	4		

104N 096		Shaker	104N/13W	59°48'0"	133°59'0"	4	
104N 097	L110	Teslin Lake	104N/15, 16W	59°50'35"	132°25'5"	5	
114P 085	L073	Lawrence	114P/10E, 09W	59°35'19"	136°30'0"	2	1

LISTING OF DOLOMITE OCCURRENCES IN MINFILE BY MINFILE NUMBER (as of February, 1991)

Information on the occurrences listed below can be obtained from the MINFILE Subsection of the Geological Survey Branch [#201, 553 Superior St. Victoria, B.C. (604) 356-2826].

The listings below can be obtained electronically from MINFILE in the form of a DBASE 3 PLUS file titled DOLOMITE.DBF.

Column C - Colour Index :
1 = White
2 = White to light grey
3 = White grading to medium grey to black or bluish grey
4 = Grey or bluish grey
5 = Grey to black
6 = black
7 = Buff, brown or buff/brownish grey

Column S - Composition Index:
(for occurrences with published sample data or reserve estimates)

1 = High purity dolomite [at least 20% MgO (41.8% $MgCO_3$)]
2 = High magnesium dolomite [at least 18% MgO (37.7% $MgCO_3$)]
3 = Limy dolomite [10-18% MgO (20.9-37.7% $MgCO_3$)]

Column P - Production Status:
C indicates current production (as of 1990)
P indicates past production

MINFILE NO.	MAP NO.	NAME	NTS SHEET	LATITUDE	LONGITUDE	C	S	P
082ESE036	D011	Grand Forks	082E/01W	49°1'55"	118°22'52"	1	1	P
082ESE200	D010	Rock Creek (Dolo)	082E/02W	49°1'13"	118°57'57"	1	2	
082ESE227	D009	Boundary Falls	082E/02E	49°2'47"	118°41'47"	2		P
082FNE075	D008	Pilot Point	082F/10W	49°38'0"	116°49'47"	3	1	
082FNE113	D006	Crawford Creek	082F/10W	49°41'33"	116°48'6"	1	1	C
082FSW253	L170	Purex Lime (Nelway)	082F/03W	49°0'56"	117°17'22"	1		
082GSW032	D020	Bull River	082G/06W	49°28'49"	115°29'13"	7		P
082JSW023	D014	Fairmont Mountain	082J/05W	50°19'28"	115°49'58"	4	1	
082JSW031	D019	Fairmont Creek	082J/05W	50°18'45"	115°46'45"	4	1	
082JSW032	D017	Geary Creek	082J/05W	50°18'24"	115°49'44"	4	1	
082JSW033	D013	Pond (Canal Flats)	082J/04W	50°3'11"	115°45'55"	4	1	
082KNE077	D016	Spillimacheen	082K/16W	50°56'8"	116°22'32"	7	1	
082KNE078	D015	Athalmer	082K/09E	50°35'23"	116°0'13"	4	1	
082KNE080		Mount Nelson	082K/08, 09, 15	50°47'17"	116°34'51"	4	3	
082LNE041	D012	Walled Claims	082L/10E	50°36'37"	118°38'5"	2		
082M 254	D007	Oro Viejo	082M/10E	51°39'27"	118°35'53"	1	1	
082N 076	D018	Glenogle	082N/07W	51°17'23"	116°50'20"			
082N 085		Yoho River	082N/08W	51°27'13"	116°26'29"	3	1	
083D 031		Grant Brook	083D/15E	52°54'34"	118°42'55"	3	1	P
092F 088	L002	Anderson Bay	092F/09E	49°31'0"	124°8'33"	3	3	P
092GNW031	D002	Candol (Sechelt)	092G/12W	49°36'4"	123°53'14"	3	2	
092GNW054	D003	Cambrian Chieftain	092G/12W	49°40'51"	123°56'14"	3	2	
092INW098	L091	Langley Lake	092I/12E	50°40'35"	121°33'51"	4	3	
092INW101	D005	Pavilion Mountain	092I/13E	50°59'15"	121°43'59"	5	1	
092K 136	L063	Frederick Arm	092K/06W	50°27'16"	125°17'59"	1	0	
092L 151	L021	Jeune Landing	092L/05, 06, 11	50°27'33"	127°31'8"	2		
092L 214	D001	Zeballos Dolomite	092L/02W	50°2'30"	126°47'10"	3	3	
092M 008	L059	Smith Inlet	092M/06E	51°22'0"	127°8'46"	1	2	P

093H 066		Iltzul Ridge	093H/03E	53°7'38"	121°12'54"		
093H 067		Cunningham Pass	093H/03W, 04E	53°4'40"	121°26'11"	7	
093H 068		Isaac Lake	093H/02W,07W	53°15'16"	120°55'56"		
093J 018		McLeod Lake	093J/15E	54°53'0"	122°45'0"		
094B 020		Halfway River	094B/03, 04, 05	56°30'42"	123°33'41"	4	
094K 078		MacDonald Creek	094K/10	58°38'0"	124°42'44"	4	
103H 038	L070	Limestone Bay	103H/05W	53°26'31"	129°58'35"	1	1
103H 039	L071	Banks I. (Lot 2224)	103H/05W	53°23'59"	129°55'3"	1	1
103H 062	L077	Banks I. (Lot 797)	103H/05W	53°15'40"	129°48'9"	1	
103J 033	D004	Claxton	103J/01E	54°5'30"	130°5'0"	1	

APPENDIX 2: LISTING OF LIMESTONE & DOLOMITE OCCURRENCES IN THIS REPORT BY MAP NUMBER

Column C - Colour Index:
1 = White
2 = White to light grey
3 = White grading to medium grey to black or bluish grey
4 = Grey or bluish grey
5 = Grey to black
6 = Black
7 = Buff, brown or buff/brownish grey

Column S - Composition Index:
(for occurrences with published sample data or reserve estimates)
1 = High-calcium [at least 95% $CaCO_3$ (53.2% CaO), up to 2% $MgCO_3$ (0.96% MgO)]
2 = Calcium [at least 75% $CaCO_3$ (42.0% CaO), less than 10% $MgCO_3$ (4.79% MgO)]
3 = Magnesium [10-40% $MgCO_3$ (4.79-19.5% MgO)]
4 = Dolomitic (dolostone) [40-45.72% $MgCO_3$ (19.5-21.86% MgO)]
5 = Impure (argillaceous/siliceous) [less than 75% $CaCO_3$ (42.0% CaO)]

Column P - Production Status:
C indicates current production (as of 1990).
P indicates past production.
A indicates active prospect in 1988 or 1989.

MAP NO.	NAME	NTS SHEET	LATITUDE	LONGITUDE	C	S	P
D001	Zeballos Dolomite	092L/02W	50°2'30"	126°47'10"	3	3	
D002	Candol (Sechelt)	092G/12W	49°36'4"	123°53'14"	3	3	
D003	Cambrian Chieftain	092G/12W	49°40'51"	123°56'14"	3	4	
D004	Claxton	103J/01E	54°5'30"	130°5'0"	4		
D005	Pavilion Mountain	092I/13E	50°59'15"	121°43'59"	5	4	
D006	Crawford Creek	082F/10W	49°41'33"	116°48'6"	1	4	C
D007	Oro Viejo	082M/10E	51°39'27"	118°35'53"	1	4	
D008	Pilot Point	082F/10W	49°38'0"	116°49'47"	3	4	
D009	Boundary Falls	082E/02E	49°2'47"	118°41'47"	2	P	
D010	Rock Creek (Dolo)	082E/02W	49°1'13"	118°57'57"	1	4	C
D011	Grand Forks	082E/01W	49°1'55"	118°22'52"	1	4	P
D012	Walled Claims	082L/10E	50°36'37"	118°38'5"	2		
D013	Pond (Canal Flats)	082J/04W	50°3'11"	115°45'55"	4	4	
D014	Fairmont Mountain	082J/05W	50°19'28"	115°49'58"	4	4	
D015	Athalmer	082K/09E	50°35'23"	116°0'13"	4	4	
D016	Spillimacheen	082K/16W	50°56'8"	116°22'32"	7	4	
D017	Geary Creek	082J/05W	50°18'24"	115°49'44"	4	4	
D018	Glenogle	082N/07W	51°17'23"	116°50'20"	4	4	P
D019	Fairmont Creek	082J/05W	50°18'45"	115°46'45"	4	4	
D020	Bull River	082G/06W	49°28'49"	115°29'13"	7	3	P
L001	Horne Lake	092F/07W	49°21'35"	124°43'47"	4		
L002	Anderson Bay	092F/09E	49°31'0"	124°8'33"	3	2	P
L003	Bonner's Quarry	092B/12E	48°41'16"	123°36'27"	4	3	P
L004	Marble Bay	092C/16E	48°50'11"	124°7'13"	2	2	
L005	Raymond	092B/12E	48°40'35"	123°38'28"	4	1	P
L006	Eagle Heights	092B/12E	48°39'55"	123°44'4"	4	2	
L007	Buttle Lake	092F/12E	49°39'13"	125°31'15"	4	2	

L008	Ideal Cement	092F/10E	49°43'9"	124°33'46"	5	1	C
L008	White-rock/Paxton L.	092F/10E	49°42'30"	124°31'44"	1	1	C
L009	Blubber Bay	092F/15E	49°47'8"	124°37'17"	5	1	C
L010	Lafarge/Beale Quarry	092F/10E, 15E	49°45'2"	124°31'41"	5	1	P
L011	Hiesholt Lake	092F/15E	49°46'9"	124°35'37"	6	1	P
L012	Imperial Limestone	092F/10E	49°44'28"	124°31'35"	3	1	C
L013	Will Claims	092F/10E	49°43'53"	124°31'14"	5	1	
L014	Davie Bay	092F/09W	49°36'25"	124°21'55"	4	2	
L015	B.C. Cement	092F/15E	49°48'5"	124°36'16"	5	1	P
L016	December Claims	092F/10E	49°44'13"	124°32'42"	3	2	
L017	Marble Bay	092F/15E	49°45'35"	124°33'53"	5	2	P
L018	Eagle Bay(Eagle Cove)	092F/15E	49°46'13"	124°34'40"	4	1	
L019	Fogh Property	092F/15E	49°47'31"	124°36'15"	3	2	P
L020	Johnson Quarries	092F/10E	49°44'24"	124°33'20"	5	2	P
L021	Jeune Landing	092L/05, 06, 11	50°27'33"	127°31'8"	3	1	P
L022	Benson Lake	092L/06W	50°23'0"	127°15'7"	2	1	C
L023	Bonanza Lake East	092L/07W	50°24'52"	126°48'20"	3	1	A
L024	Bonanza Lake West	092L/07W	50°24'4"	126°48'51"	3	1	A
L025	Tsulton/Nimpkish Lake	092L/07W	50°25'10"	126°57'16"	3	1	A
L026	Fox	092L/12W	50°37'13"	127°56'3"	3	2	
L027	Beaver Cove	092L/10W	50°31' 0"	126°53'30"	3	1	P
L028	Port McNeill (Eric)	092L/11E	50°33'25"	127°3'40"	2	1	P
L029	Hankin Point	092L/12E	50°35'8"	127°33'6"	4	2	
L030	Nootka Marble	092E/15E, 10E	49°45'0"	126°30'30"	2	1	P
L031	Kains Lake	092L/12E	50°41'59"	127°39'56"	1		
L032	Spencer Creek	092C/15W	48°57'58"	124°51'10"	4	1	
L033	Kennedy Lake East	092F/03W, 04E	49°3'46"	125°28'53"	3	1	
L034	Bamberton	092B/12E	48°35'12"	123°31'25"	4	1	P
L035	Effingham Inlet	092F/03E	49°2'38"	125°10'57"	3	2	P
L036	Harris Creek	092C/09E	48°41'23"	124°14'0"	5	1	
L037	Gordon River	092C/16W	48°45'51"	124°20'31"	5	1	
L038	Nixon Creek	092C/16W	48°50'17"	124°28'38"	5	1	
L039	Kennedy Lake West	092F/04E	49°3'17"	125°36'24"	4	1	
L040	Tod Inlet/Quarry Lake	092B/11W	48°33'58"	123°28'19"	5	1	P
L041	Sproat Lake	092F/02W	49°13'4"	124°58'11"	4		
L042	Open Bay	092K/03E	50°8'25"	125°12'27"	5	2	
L043	Harbledown Island	092L/10E	50°33'55"	126°30'54"	4	2	
L044	Cluxewe River	092L/11E	50°33'2"	127°8'45"	5	1	P
L045	Kunga Island	103B/13E	52°45'40"	131°34'20"	4	1	
L046	Limestone Island	103B/13E	52°54'30"	131°36'40"	4	1	
L047	Gillatt Arm	103F/01E	53°2'45	132°1'47"	3	2	
L047	Cumshewa Inlet	103F/1, 103G/4	53°2'17"	132°00'25"			
L048	Sandilands Island	103F/01E	53°10'20"	132°5'10"	4		
L049	Kashutl Inlet	092L/03W	50°9'23"	127°18'56"	2	1	
L050	Rosebank	092B/06W	48°26'37"	123°27'29"	3	1	P
L051	Millstream	092B/05E	48°28'55"	123°30'25"	2	P	
L052	Atkins Road	092B/06W	48°26'58"	123°28'24"	4	1	P
L053	Wrigglesworth Lake	092B/12E	48°31'14"	123°34'27"	3	1	
L054	Malahat (Jefford)	092B/12E	48°32'42"	123°36'31"	3	1	P
L055	Parsons Bridge	092B/06W	48°27'13"	123°27'26"	4	2	P
L056	Nitinat Southeast	092C/10W	48°41'24"	124°47'57"	4		
L057	Nitinat Northwest	092C/10W	48°41'49"	124°48'49"	1	1	
L058	Beale's Quarry	093D/04W	52°11'19"	127°58'55"	1	1	P
L059	Smith Inlet	092M/06E	51°22'0"	127°8'46"	1	2	P
L060	Koeye River	092M/13W	51°46'56"	127°51'36"	3	1	P
L061	King Island	092M/13W	51°56'1"	127°52'25"	2	2	P
L062	Nelson Island	092F/09E	49°44'36"	124°9'0"	1	1	P
L063	Frederick Arm	092K/06W	50°27'16"	125°17'59"	4	2	
L064	Sandell Bay	092M/12E	51°39'18"	127°32'17"	2	1	
L065	West Redonda Island	092K/07W	50°17'11"	124°51'0"	3	3	P
L066	Bold Point	092K/03E	50°10'34"	125°10'20"	4	1	
L067	Kilbella Bay	092M/11W	51°40'55"	127°21'53"	1	1	
L068	Laredo Limestone	103A/11E	52°41'16"	129°2'55"	1	1	P
L069	Kumealon Inlet	103H/13W	53°52'49"	129°59'46"	3	1	
L070	Limestone Bay	103H/05W	53°26'31"	129°58'35"	1	2	
L071	Banks I. (Lot 2224)	103H/05W	53°23'59"	129°55'3"	1	1	
L072	Swamp Point	1030/08E	55°28'29"	130°2'30"	3	1	P
L073	Lawrence	114P/10E, 09W	59°35'19"	136°30'0"	2	1	
L074	Marmor	103H/01E	53° 6'29"	128°12'23"	4		

L075	Colby Bay	103G/09	53°34'27"	130°15'33"	1		
L076	Frederick Point	103J/08W	54°15'20"	130°21'40"	3		
L077	Banks I. (Lot 797)	103H/05W	53°15'40"	129°48'9"	1		
L078	Smith Island	103J/01E	54°10'10"	130°12'10"	1	1	P
L079	Hanmer Island	103J/01E	54°3'25"	130°15'0"	3	2	
L080	Princess Royal Island	103A/15E	52°54'8"	128°31'27"	1	1	P
L081	Chilliwack North	092H/04E	49°5'33"	121°42'0"	4	2	
L082	Chilliwack South	092H/04E	49°4'35"	121°42'38"	4	2	
L083	Popkum Limestone	092H/04E	49°11'57"	121°43'5"	4	2	P
L084	Agassiz	092H/04W	49°13'17"	121°47'55"	4	2	P
L085	Bear Mountain	092H/05	49°17'29"	121°45'0"	3	2	
L086	Marble Canyon	092I/13E	50°49' 4"	121°59'11"	2	1	C
L087	Kelley Lake	092P/04W	51°4'52"	121°49'7"	3	1	
L088	Jesmond Quarry	092P/04W	51°7'15"	121°51'31"	3	1	
L089	Bowden Creek	092P/04E	51°2'47"	121°41'9"	3	1	P
L090	Anderson Creek	092I/12	50°43'6"	121°41'48"	4	1	
L091	Langley Lake	092I/12E	50°40'35"	121°33'51"	4	2	
L092	Robertson Creek	092I/13E	50°52'5"	121°34'49"	4	2	
L093	Cornwall Creek	092I/11W	50°43'31"	121°19'59"	4	1	
L094	Clinton	092P/04E	51° 4'38"	121°38'15"	4	2	P
L095	Maiden Creek	092I/13E	50°55'29"	121°33'33"	4	2	
L096	Dahl Lake Quarry	093G/14W	53°47'31"	123°17'11"	5	1	C
L097	Vanderhoof	093G/13	53°59'35"	123°44'49"	3	1	A
L098	Necoslie River	093K/08E	54°23'1"	124°7'51"	4	1	P
L099	John (Necoslie River)	093K/08E	54°22'5"	124°5'53"	4	2	
L100	Stuart Lake South	093K/08W	54°27'37"	124°17'47"	4	1	P
L101	Stuart Lake North	093K/08W	54°28'30"	124°19'27"	4	1	P
L102	Indata Lake	093N/06	55°17'34"	125°15'54"	7	1	
L103	Kwanika Creek	093N/06E, 11E	55°29'47"	125°21'15"	7	1	
L104	Bralorne	093N/11W	55°34'4"	125°23'37"	3	1	
L105	Pinchi Lake	093K/09W	54°37'30"	124°24'30"	3	2	
L106	Vital Creek	093N/11W	55°43'6"	125°28'12"	4	1	
L107	Nakina River	104N/02, 07, 08	59°11'0"	132°44'0"	4		
L108	Talaha Bay	104M/16E	59°58'29"	134°8'7"	4		
L109	French Range	104J/09, 10, 16	58°40'0"	130°35'20"	4		
L110	Teslin Lake	104N/15, 16W	59°50'35"	132°25'5"	5		
L111	Nahlin River	104J/13W	58°48'21"	131°51'21"	4		
L112	Camel's Hump	082L/02W	50°13'47"	118°52'41"	4	2	
L113	Creighton Valley	082L/02W	50°12'25"	118°54'2"	2	2	
L114	Vernon	082L/06W	50°15'24"	119°18'33"	4	2	P
L115	Monashee Pass	082L/02E	50°6'29"	118°30'33"	3	2	
L116	Lafarge Canada	092I/09E	50°40'15"	120°3'56"	4	1	C
L117	Mount Harper	092I/09E	50°42'48"	120°5'50"	4	2	
L118	Westwold	082L/05W	50°26'48"	119°49'23"	1	1	P
L119	Black Pines	092I/16W	50°55'24"	120°15'45"	2	2	P
L120	Jamieson Range	092I/16W	50°59'12"	120°16'19"	2	1	
L121	Salmon River North	082L/05E	50°28'55"	119°41'5"	4	2	
L122	South Thompson River	092I/09E	50°40'20"	120° 7'43"	4	1	
L123	Rayleigh South	092I/16W	50°46'42"	120°18'19"	4	2	P
L124	Salmon River South	082L/05E	50°27'53"	119°40'26"	6	5	
L125	Terrace Calcium	103I/09W	54°30'42"	128°28'18"	1	1	P
L126	Barr Quarry (Shames)	103I/07W	54°25'31"	128°53'43"	3	2	P
L127	Mayner's Fortune	103I/07E	54°24'34"	128°39'18"	1	2	
L128	Dardanelle	103I/08E	54°28'54"	128°12' 9"	1		
L129	Cart & Lime	093L/16W	54°53'31"	126°18'20"	2		A
L130	Scud River	104G/03, 04, 05	57°10'0"	131°20'0"	3		
L131	Saddle Rock	092H/11W	49°37'58"	121°23'35"	4	2	P
L132	Sumallo River	092H/03E	49°13'11"	121°5'32"	3		
L133	Marshall Ridge	092J/15E	50°53'17"	122°34'56"	1		
L134	Piebiter Creek	092J/10E	50°43'21"	122°38'54"	3	1	
L135	Armstrong	082L/06E	50°28'38"	119°13'47"	3	1	P
L136	Bald Range	082L/4, 82E/13	50°2'6"	119°33'55"	1	1	A
L137	Hedley	092H/08E	49°21'14"	120°4'3"	4	2	P
L138	Martel	092I/11W	50°30'38"	121°17'1"	5	1	
L139	Promontory Hills	092I/02W	49°15'14"	121°1'42"	4	2	
L140	Harmon Lake	092H/15E	49°59'18"	120°41'21"	4	1	
L141	Law's Camp	092H/10W	49°33'54"	120°54'10"	1	1	
L142	Swakum Mountain	092I/07E	50°17'19"	120°41'19"	7	2	
L143	Nicola Lake	092I/02E	50°7'35"	120°34'29"	4	1	

L144	Walhachin	092I/14E, 11E	50°45'30"	121°1'55"	4	2	
L145	Rattlesnake Hill	092I/14E	50°45'49"	121°12'0"	2	2	
L146	Olalla Creek	082E/05W	49°17'23"	119°52'51"	3	2	P
L147	Calcite (Fulton Lake)	093L/16E	54°49'0"	126°17'18"	2		A
L148	Beverley	093G/15W	53°45'48"	122°56'0"	4	2	P
L149	Butler Range	094C/11E	56°37'16"	125°4'45"	4	1	
L150	Lookout Hill	094C/11E	56°41'12"	125°10'15"	3	1	
L151	Osilinka River	094C/03E	56° 9'34"	125°5'36"	4	1	
L152	Swannell River	094C/12W	56°34'43"	125°45'19"	4	2	
L153	Mount Lay	094C/12, 11W	56°34'25"	125°30'1"	7	2	
L154	Lost Creek	082F/03E	49°4'54"	117°14'27"	1	2	C
L155	Swift Creek	082F/03W	49°4'6"	117°16'55"	3	2	P
L156	South Salmo River	082F/03W	49°4'39"	117°15'45"	3	1	
L157	Wallack Creek	082F/03W	49°2'23"	117°19'24"	4	2	
L158	Marblehead Marble	082K/07W	50°15'38"	116°58'20"	3	2	P
L159	Lardeau	082K/02W	50°9'40"	116°57'32"	3	2	P
L160	Schroeder Creek	082K/02W	50°2'5"	116°54'34"	4	2	P
L161	Riondel	082F/15W	49°45'40"	116°51'30"	2		P
L162	Albert Canyon	082N/04W	51°9'5"	117°49'42"	4	3	P
L163	Vavenby	082M/12E	51°35'40"	119°44'40"	2	1	P
L164	Onyx Creek	082M/03W	51°2'19"	119°17'7"	2		
L165	Ptarmigan Creek	093H/10W	53°40'46"	120°54'30"	4	1	P
L166	Bowron River	093H/12E	53°42'40"	121°41'38"	3	1	P
L167	Hansard	093I/04W	54°5'45"	121°53'21"	5	1	P
L168	Highway 16	093H/13E	53°53'47"	121°41'38"	6	1	
L169	Tacheeda Lakes	093J/10E	54°43'0"	122°31'44"	5	2	P
L170	Purex Lime (Nelway)	082F/03W	49°0'56"	117°17'22"	3	1	P
L171	Sidmouth	082K/12W	50°43'30"	117°57'30"	1	1	P
L172	Proctor	082F/10W	49°37'13"	116°55'27"	2	3	P
L173	Redrocky Creek	093J/10E	54°37'56"	122°42'16"	5	1	P
L174	Angusmac	093J/10E	54°37'42"	122°37'54"	6	2	
L175	Pend d'Oreille	082F/03W, 04E	49°2'49"	117°28'55"	2	2	
L176	Lime Creek	082E/01W	49° 8'57"	118°27'30"	4	2	P
L177	Boundary Falls	082E/02E	49°3'8"	118°41'13"	3	1	P
L178	Ainsworth	082F/10W, 15W	49°46'7"	116°56'31"	3	2	
L179	McKenzie (Bend)	093O/03E	55°10'17"	123°11'57"	7	1	P
L180	Fife	082E/01E	49°4'18"	118°12'21"	3	2	P
L181	Broadwater	082E/08E	49°28'2"	118°5'7"	3	2	P
L182	Salmon Arm	082L/11E	50°42'19"	119°12'2"	1	1	
L183	Blind Bay	082L/14W	50°52'47"	119°22'12"	4	2	
L184	Grindrod	082L/11E	50°37'33"	119°8'57"	5	2	
L185	Sorrento	082L/14W	50°52'40"	119°25'35"	4	2	
L186	Hardy Creek	082E/01W, 02E	49°3'1"	118°29'20"	5	2	P
L187	Marguerite	082E/02E	49°7'13"	118°42'4"	3	1	P
L188	Deadwood Creek	082E/02E	49°6'46"	118°43'0"	3	1	
L189	Oro Denoro	082E/02E	49°7'19"	118°32'38"	2	2	
L190	Midway - West Lens	082E/02W	49°1'30"	118°51'21"	3	2	P
L190	Midway - East Lens	082E/02W	49°1'11"	118°50'13"	4	1	
L191	Eholt	082E/02E	49°8'13"	118°32'44"	2		
L192	Blue River Calcite	083D/03W	52°7'40"	119°18'40"	1	2	A
L193	Highway 6	082L/03E	50°14'37"	119°14'23"	4	2	
L194	Penny (Toad River)	094K/12E	58°43'26"	125°40'56"	1	1	A
L195	Wardner South	082G/06W	49°24'36"	115°25'17"	4	3	
L196	Wardner North	082G/06W	49°26'9"	115°24'3"	7	1	
L197	Kootenay River East	082G/06W	49°27'16"	115°25'43"	7	1	P
L198	Kootenay River West	082G/06W	49°26'37"	115°28'47"	3	2	
L199	Prime Lime	093P/04W	55°9'9"	121°55'2"	7	1	P
L200	Mount Palsson	093P/04W	55°8'34"	121°52'42"	7	1	A

MAPS
NOT
FILMED

CARTES
OMISES